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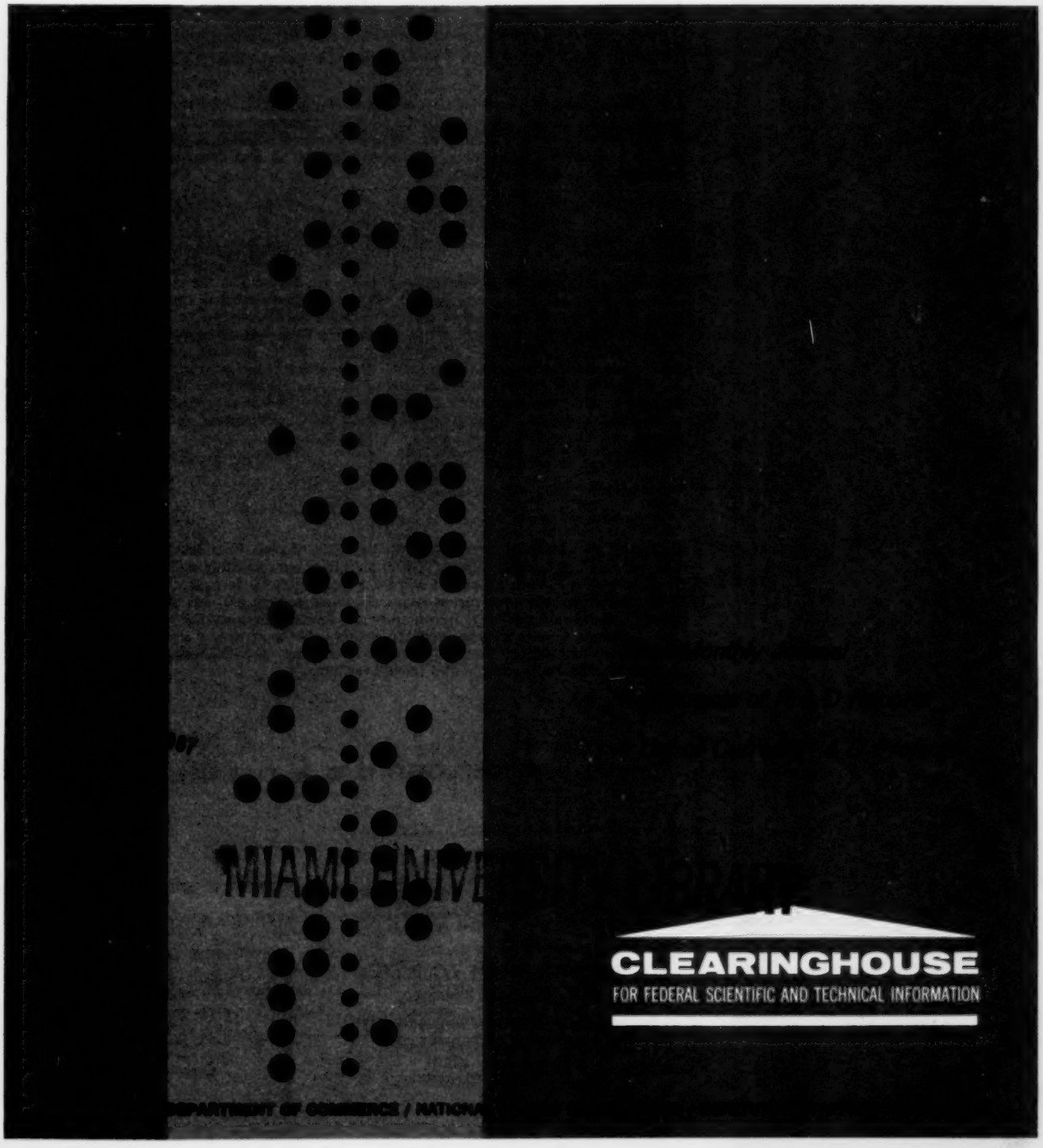
U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS

December 25, 1966



December 25, 1966 / Volume 41, Number 24

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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PURPOSE

U.S. Government Research & Development Reports (USGRDR) announces the availability of selected new reports of U.S. Government-sponsored R & D released by the Department of Defense, the Atomic Energy Commission, National Aeronautics & Space Administration, and other agencies. It also lists current Government-sponsored R & D projects.

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With few exceptions, reports announced herein are available to the public from the Clearinghouse. Order reports by the accession/report number (stock number) given on the first line of each entry. Order from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Department of Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche (MF) are given in the entry. Prepayment is required unless purchases are to be charged to Clearinghouse deposit accounts. Make check or money order payable to National Bureau of Standards—CFSTI. When reports are announced as available from an organization other than the Clearinghouse, order from that source.

INDEX

All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $1.75. Indexing data from recent issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

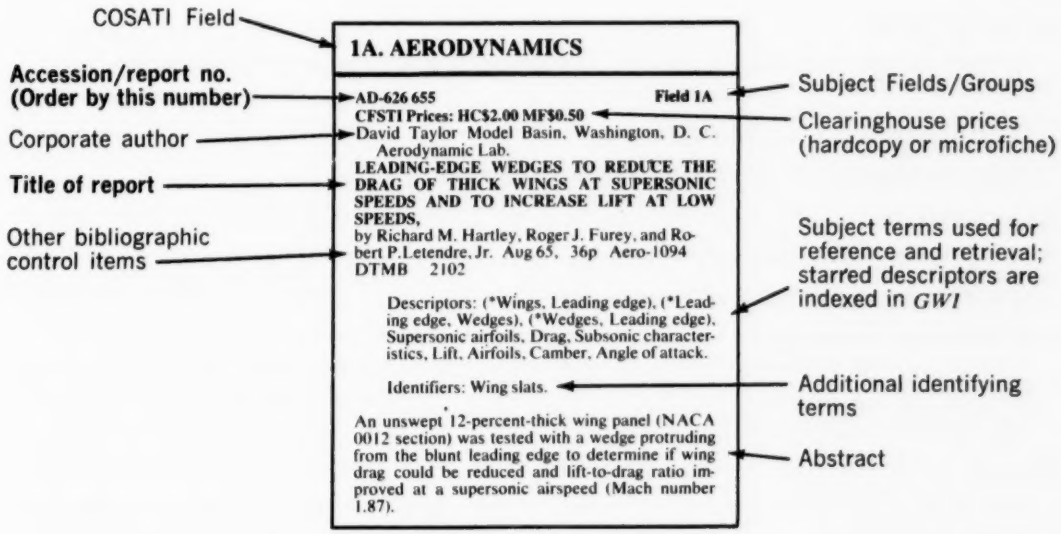
CLEARINGHOUSE FOR FEDERAL SCIENTIFIC
AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated. Use of funds for this publication approved by the Director of the Bureau of Budget, June 22, 1966.

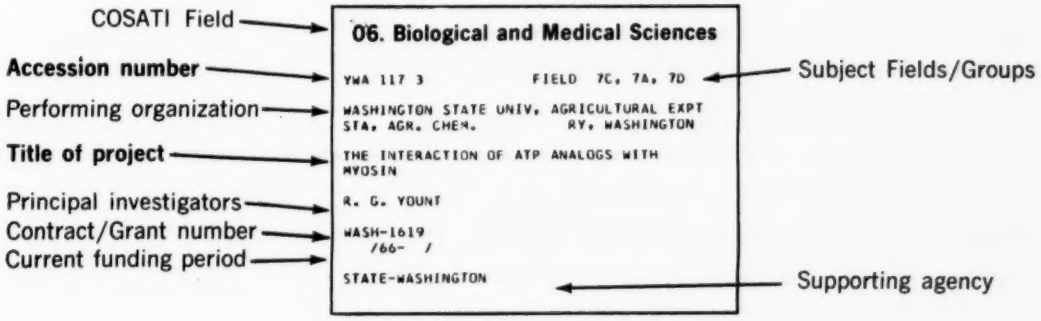
USGRDR FORMAT

Entries are arranged under 22 subject categories called FIELDS. In the entry, subcategories called GROUPS and occasionally sub-groupings are also indicated. This system was adopted by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology. The COSATI Subject Category List, AD 612 200, is available from the Clearinghouse at $1.00. Documents are listed alphanumerically (that is, alphabetic data precedes numerical data) by accession/report number. Key segments of information contained in the entries are identified diagrammatically below.

● RESEARCH & DEVELOPMENT REPORTS


COSATI Field
1A. AERODYNAMICS
Accession/report no. (Order by this number)
AD-626 655
Field 1A
Subject Fields/Groups
CFSTI Prices: HC$2.00 MF$0.50
Clearinghouse prices (hardcopy or microfiche)
Corporate author
David Taylor Model Basin, Washington, D. C. Aerodynamic Lab.
Title of report
LEADING-EDGE WEDGES TO REDUCE THE DRAG OF THICK WINGS AT SUPERSONIC SPEEDS AND TO INCREASE LIFT AT LOW SPEEDS,
Other bibliographic control items
by Richard M. Hartley, Roger J. Furey, and Robert P.Letendre, Jr. Aug 65, 36p Aero-1094 DTMB 2102
Subject terms used for reference and retrieval; starred descriptors are indexed in GWI
Descriptors: (*Wings, Leading edge), (*Leading edge, Wedges), (*Wedges, Leading edge), Supersonic airfoils, Drag, Subsonic characteristics, Lift, Airfoils, Camber, Angle of attack.
Identifiers: Wing slats.
Additional identifying terms
An unswept 12-percent-thick wing panel (NACA 0012 section) was tested with a wedge protruding from the blunt leading edge to determine if wing drag could be reduced and lift-to-drag ratio improved at a supersonic airspeed (Mach number 1.87).
Abstract

● CURRENT R & D PROJECTS



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Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE 7
Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS 7
Includes astronomy; astrophysics; and celestial mechanics.

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06 BIOLOGICAL AND MEDICAL SCIENCES 31
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11	MATERIALS Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.	80
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special ANNOUNCEMENTS

CURRENT R and D SECTION TO BE DISCONTINUED

The Clearinghouse will suspend publication of the "Current Research and Development Projects" section after the December 25, 1966, issue of USGRDR.

The present concept of publishing information on unclassified research and development in progress is being restudied by the Clearinghouse in an effort to determine the best way for expanding and improving the format for announcement to the industrial and scientific community.

While the study is underway, information on such research can be obtained from the Science Information Exchange of the Smithsonian Institution, where Federal agencies report their new research projects.

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Chemical Processing

THE SYNTHESIS OF SMALL RING COMPOUNDS fused to an aromatic frame with the aza-atom either exocyclic or endocyclic to the small ring has been partially successful, according to chemists at Fordham University. Among the accomplishments of this Air Force-sponsored research were: (1) 2-Substituted-1-indanones were ring expanded to 2-hydroxyisocarbostyrils (cyclic hydroxamic acids) via the intermediacy of isolable nitroso dimers; (2) 1-Methyl-3-diazooxindole waa prepared and both pyrolytically and photolytically decomposed in the presence of reagents which would react with the generated oxindolyl carbene in either or both singlet and triplet states; and (3) the oxidation of 2,3-bis(bromomethyl)quinoxaline with dimethyl sulfoxide (DMSO) produced in varying amounts 3-methyl, 3-bromomethyl-, 3-dibromomethyl-2-quinoxalinecarboxaldehyde, in addition to 2,3-bis(dibromomethyl)-quinoxaline and 2,3-quinoxalinedecarboxaldehyde, isolated as its cyclic monohydrate. . . E. I. Moriconi et al., Department of Chemistry, Fordham University, New York, Oct. 1966, 22 pages . . . Order Stock No. AD-641 303 -- SMALL RING COMPOUNDS, price $1.00 (microfiche 50 cents).

PROCEDURES FOR SAMPLING AND TESTING OF PROCESS CHEMICALS, FEED MATERIALS PRODUCTS, AND WASTE STREAMS are now available in a manual compiled by the Mallinckrodt Chemical Works. Testing materials are limited to uranium ore concentrates, uranium trioxide, uranium dioxide, uranium tetrafluoride, uranium metal, thorium oxide, process chemicals, and waste streams, which are first sampled, then tested for other elements or materials, properties, and reactions. A section on analysis of uranium samples by spectrochemical methods is included. An abstract at the beginning of each procedure indicates the purpose of the test, apparatus and reagents used are listed, and the procedure is given step by step in minute detail, which includes separate precautionary notes and instructions in the care of equipment and chemicals. . . M. A. Speer and R. T. Springgate, Eds., Mallinckrodt Chemical Works, Weldon Spring, Mo., for the AEC, Sept. 1966, 606 pages . . . Order Stock No. MCW-1507 - - SPECIFICATIONS TESTING MANUAL, price $6.00 (microfiche $2.50).

A SPECTROCHEMICAL METHOD FOR DETERMINING RARE EARTH ELEMENTS in uranium ore concentrates and high-purity uranium has been devised by Mallinckrodt Chemical. The method involves a preliminary chemical concentration of the rare earth elements, followed by a spectrographic analysis of the rare earth concentrate by direct-current excitation using neodymium as an internal standard. Mallinckrodt notes that the high thermal-neutron cross-section of certain rare earth elements makes necessary their control in uranium produced for nuclear purposes. The chemical similarity of the rare earth group makes a chemical approach to the determination of specific members analytically impractical. The advantage of specific identification inherent in spectrographic methods is offset by the problem of strong spectral interference by the uranium matrix on the relatively weak line intensities of the rare earths. This problem, plus the biasing effect of varying concentrations of Ca, Mg, Na, and PO_4 in ore concentrates prevent the use of a direct spectrographic method without prior separation of the rare earth group from the interfering elements. Thus, Mallinckrodt devised the preliminary chemical separation of the rare earth group from interfering elements followed by a spectrographic determination of individual elements in the rare earth fraction. . . R. S. Vogel et al., Mallinckrodt's Weldon Spring Plant, Mo., for the AEC, report received Oct. 1966. . . Order Stock No. MCW-1498 -- A SPECTROCHEMICAL METHOD FOR THE DETERMINATION OF INDIVIDUAL RARE EARTH ELEMENTS IN URANIUM ORE CONCENTRATES AND HIGH-PURITY URANIUM COMPOUNDS, 17 pages, price $3.00 (microfiche 65 cents).

A PROCESS OF CONTINUOUS FLOW, IN-LINE FRACTIONATION AND EXCHANGE OF VOLATILE SOLVENTS which can be applied to a wide variety of solvent systems has been developed by the Air Force School of Aerospace Medicine. The solvent mixtures are introduced to a heated, inclined, perforated conduit, and a stream of heated inert gas is passed over the perforations so that the more volatile fluid evaporates. The residue can then be removed from the bottom of the tube. This method is specifically applicable to the exchange of ethanolic potassium hydroxide for diethyl ether in the automated assay of serum glycerides and cholesterol. . . M. J. Stansell and H. H. Malvin, USAF School of Aerospace Medicine (SAM-TR-66-83), Brooks AFB, Tex. , Sept. 1966, 14 pages. . . Order Stock No. AD-641 567 -- A PROCESS FOR THE CONTINUOUS FLOW, IN-LINE FRACTIONATION AND EXCHANGE OF VOLATILE SOLVENTS IN AUTOMATED CHEMISTRY, price $1.00 (microfiche 50 cents).

Biological and Medical Sciences

AN ASSAY OF THE CARCINOGENICITY OF OVER 50 CHEMICALS has been made on test animals by doctors at the Mason Research Institute, Worcester, Mass. Their final report of a 2-1/2 year study gives toxicological data on which the selection of the dose levels for the final assay were based. The report furnishes the following information on each and every animal that was placed in the final study: (1) number of daily treatments, (2) survival days and whether the animal died or was sacrificed, (3) inital and final body weights, (4) type or types of tumor found, verified by histologic examination, (5) non-neoplastic lesions found, and (6) the weights of the liver, spleen, adrenals, and the pituitary. . . Z. Hadidian and T. N. Fredrickson, Mason Research Institute, Worcester, Mass., report received Oct. 1966. . . Order Stock No. PB-173 466 -- ASSAY OF CARCINOGENICITY OF VARIOUS CHEMICALS, price $3.00 (microfiche 75 cents).

AN EXPERIMENTAL ANTIBIOTIC EVALUATED BY Mason Research Institute displayed no significant toxic effects on test animals but the researchers say the compound appears more hazardous than ever as a result of their study. In an earlier study the compound was found to be lethal within 21 days to the 3 test dogs at the daily dose level of 0.020 mg/kg. In tests of the compound at 0.010 mg/kg in which no toxic effects were noted, the researchers observe that the killing dose level was only twice that of the harmless dose. "That the compound is dangerous," says the Institute's report, "is testified by the fact that the difference between its lethal dose and apparently innocuous dose is only twofold." The formulation had the following label: Each ml contains: M-259 0.1 mg, Alcohol 10%, Dextran 5.4%, Sodium Chloride 0.81%, Benzyl Alcohol 0.9%, hydrochloric acid to adjust pH. . . Z. Hadidian, Mason Research Institute, Worcester, Mass., for National Cancer Institute, report received Oct. 1966. . . Order Stock No. PB-173 462 -- TOXICOLOGIC EVALUATION OF ABBOTT CRYSTALLINE ANTIBOTIC NSC-51954 (CLINICAL FORMULATION), 13 pages, price $1.00 (microfiche 50 cents).

FLIGHT DATA AND RESULTS OF RADIOCHEMICAL ANALYSIS OF AIR FILTER SAMPLES collected during 1965 have been compiled for the Defense Atomic Support Agency. The sampling, the thirteeth made for Project Stardust, was carried out at altitudes of 50,000 feet and higher using a Lockheed WU-2 as the main vehicle. The plan followed in the radiochemical analysis of the Stardust filter samples has been designed to acquire data on atmospheric diffusion and circulation, and to delineate the distribution of the radioactive debris in the stratosphere to permit the calculation of the stratospheric burden of such debris. The program of radiochemical analysis of filter samples has evolved into a system which includes six basic groups: (1) fission products, such as strontium-90 and cerium-144; (2) long-lived, potentially hazardous nuclides, such as cesium-137 and plutonium-239, and the tracer nuclide, plutonium-238; (3) several products of neutron activation, including manganese-54 and cadmium-109; a group comprising a combination of these three; (5) several products of cosmic ray activity, including beryllium-7 and phosphorus-32; and (6) radon decay products, lead-210 and polonium-210. . . H. W. Feely et al., Isotopes, Inc., Westwood, N. J., for DASA and Health and Safety Laboratory, USAEC, New York City, July 1966. . . Order Stock No. HASL-176 -- FLIGHT DATA AND RESULTS OF RADIOCHEMICAL ANALYSES OF FILTER SAMPLES COLLECTED DURING 1965 UNDER PROJECT STARDUST, 90 pages, price $3.00 (microfiche 75 cents).

Earth Sciences

REVISION MATERIAL FOR THE WORLD-WIDE STANDARD SEISMOGRAPHY NETWORK HANDBOOK has been compiled by the University of Michigan's Geophysics Laboratory. First published in April 1964 and revised in July 1964, the handbook is a compilation of information about each of the network's 106 stations. The latest revision material includes information on 15 stations installed between July 1964 and July 1965 as well as additional data on some of the original stations. Information includes station facilities, station environment, station and pier construction, instrumentation, local topography and geology, instrument magnifications, local background and noise, and research in progress. Maps, diagrams, and photographs supplement the text. . . University of Michigan, Ann Arbor, Aug. 1965 revision received Sept. 1966, 195 pages. . . Order Stock No. AD-638 212 -- HANDBOOK: WORLD-WIDE STANDARD SEISMOGRAPH NETWORK, price $5.00 (microfiche $1.00). The July 1964 revised material is AD-439 691-1 -- Same Title, 310 pages, price $7.00 (hard copy only). The original handbook of Apr. 1964 is AD-439 691 -- Same Title, 377 pages, price $21.00 (hard copy only).

EARTH-OBSERVATION SPACECRAFT USING REMOTE SENSORS have potential applications in the fields of geography, forestry, oceanography, geology, agriculture, hydrology, wildlife management, air pollution, and archaeology, according to a 3-volume study by the University of Michigan's Institute of Science and Technology. The Institute has made an assessment of a number of applications which most obviously meet requirements of technical feasibility and significant benefit to the nation. Use of spacecraft has advantages over conventional aircraft in that larger areas of the earth's surface can be observed in a relatively short time and at moderate expense. Using this premise, the Institute suggests a program of further investigation which would lead to full realization of the required orbital-sensing capabilities. The program would include a series of preorbital experiments, conducted in ground-based laboratories and test sites and using preliminary versions of sensing equipment flown in conventional aircraft. Current equipment discussed includes multispectral sensors, infrared sensors, passive microwave sensors, conical scanning, radars, laser altimeters, and three types of cameras. Ground measurements and low altitude experiments will establish such detection mechanisms for the particular application and will permit a general prototype sensor configuration to be determined. The major part of the program, according to the Institute, is to define the experiments to be conducted in manned earth-orbiting research laboratories, to complete the development of the techniques, and to demonstrate their adaptability to operational use. These orbital experiments would check the technical performance of equipment under conditions of environmental change and use the equipment to obtain imagery of selected ground sites which could be studied by scientists in each specialized discipline. The program could become operational in the post-1975 time period as part of the Space Agency's Apollo Experiments Support Program. . . University of Michigan, Ann Arbor, for NASA, Sept. 1966. . . Order Stock Nos. NASA CR-586 -- PEACEFUL USES OF EARTH-OBSERVATION SPACECRAFT, VOL. 1 -- INTRODUCTION AND SUMMARY, 63 pages, price $2.50 (microfiche 75 cents); NASA CR-587 -- Same Title, VOL. 2 -- SURVEY OF APPLICATIONS AND BENEFITS, 165 pages, price $3.25 (microfiche $1.00); and NASA CR-588 -- Same Title, VOL. 3 -- SENSOR REQUIREMENTS AND EXPERIMENTS, 233 pages, price $3.75 (microfiche $1.50).

AMPLITUDE VARIATION IN SEISMIC BODY WAVES due to energy dissipation during transmission may only be studied after accounting as thoroughly as possible for the effects of source characteristics, energy partitioning at interfaces in the crust and mantle, scattering and spreading losses, as well as of local crustal structure and, finally, of instrumental distortion. So reports the Geophysical Institute at Karlsruhe, Germany, whose seismologists add that all of these factors make amplitude data much more difficult to interpret than travel time information. They indicate that any attempts to study the nonelastic deficiencies of the propagation medium will only succeed if the elastic properties of the transmission system are sufficiently well understood. To this end, the Institute scientists have conducted a one-year study of the nonelastic behavior of the upper mantle. . . S. Mueller and K. Fuchs, Geophysical Institute, Technical University, Karlsruhe, Federal Republic of Germany, for the U. S. Air Force Office of Scientific Research and ARPA's Project VELA-UNIFORM, received Oct. 1966. . . Order Stock No. AD-641 312 -- INVESTIGATIONS ON THE NONELASTIC BEHAVIOR OF THE UPPER MANTLE, 60 pages, price $3.00 (microfiche 75 cents).

Fluid- and Aerodynamics

A NEW DESIGN PROCEDURE TO DETERMINE PERFORMANCE GAINS OF AIRCRAFT WINGS has been developed by Northrop Corporation. The purpose of this Navy-sponsored work was to determine the performance gains of wings designed for optimized high lift by a procedure based on lifting surface theory for wings in steady subsonic flow. The study was also conducted to verify the design computer programs developed for the Navy, and to examine the limits of applicability of planar lifting surface theory to high lift design. Volume I of Northrop's three-volume research report gives results of the comparison of the theoretically predicted performance of the wings with the wind tunnel tests, and compares these results and the performance of wings designed by other methods. Volume II describes the development of the four wings which were designed to have specific aerodynamic requirements. Wings designed were a high lift wing, a smooth lift or cruise wing, and two flapped wings which were approximations of the smooth wings. Volume III gives the description of the wind tunnel tests and the test data which lead Northrop to the conclusion that their new design procedure is superior to the old cut and try methods. They indicate that if high lift is of prime importance in a mission, the penalties are less if the wing is designed for optimized high lift and flapped for low lift. . . J. R. Stevens et al., Northrop Corporation, Norair Division, Hawthorne, Calif., for Bureau of Naval Weapons, Washington, D. C., May 1966. . . Order Stock Nos. AD-639 255 -- HIGH LIFT SURFACE DESIGN PROCEDURES EXPERIMENTAL VERIFICATION, Vol. I, SUMMARY AND EVALUATION, 76 pages, price $3.00 (microfiche 75 cents); AD-639 289 -- Same Title, Vol. II, THEORETICAL DESIGN AND ANALYSIS, 126 pages, price $4.00 (microfiche $1.00) ; and AD-639 191 -- Same Title, Vol. III, WIND TUNNEL TESTS, 194 pages, price $7.00 (microfiche $1.50).

TO STUDY THE PROPERTIES OF LIQUIDS, the Rensselaer Polytechnic Institute has developed a rectilinear fluid flow generator of an oscillating type that is of relatively simple design. The apparatus is for use in studying the rheological properties and flow characteristics of both Newtonian and non-Newtonian liquids. It consists essentially of a long horizontally supported straight tube which can be filled with a liquid in which an equally long concentric cylinder can be oscillated axially in harmonic motion at a predetermined frequency and amplitude. The external tube is mounted on elastic supports of measurable stiffness so that its natural frequency of axial oscillation can be readily calculated. In addition, the motion of the external tube and the resultant force acting on it are readily measurable at any time. The principle of the apparatus depends on the fact that the outside tube is moved only by the liquid which itself is caused to flow by the controlled oscillations of the inside tube. It is assumed, at least in principle, that if the motion of the outside tube is known for a given notion of the inside cylinder, the constitutive equations for the liquid can be determined. Conversely, if the constitutive equations are known, the motion of the outside tube can be calculated for a given motion of the driving inside cylinder. Since the external tube is made of glass, microscopes and flow visualization techniques can be used to study the nature of the flow. . . W. H. Hoppmann II and E. Kiss, Rensselaer Polytechnic Institute, Troy, N. Y., for Office of Naval Research, Washington, D. C., Aug. 1966, 21 pages. . . Order Stock No. AD-637 552 -- RECTILINEAR FLUID FLOW GENERATOR OF OSCILLATING TYPE, price $1.00 (microfiche 50 cents).

Management Control

THE LATEST INTERNATIONAL CUSTOMS JOURNAL available from the Clearinghouse as a permanent reference copy covers the Central African Customs and Economic Union. Published by the International Customs Tariffs Bureau in Brussels, the Journal consists of translations of the national customs tariffs as well as other official pronouncements bearing on their custom systems. Until recently, the U. S. Department of Commerce has furnished the Journals to businessmen on a loan basis, but they are now available to U. S. exporters for their permanent use. . . Order Stock No. PB-173 465 -- CENTRAL AFRICAN CUSTOMS AND ECONOMIC UNION (Federal Republic of Cameroun, Central African Republic, Republic of the Congo, Gabonese Republic, Republic of Chad). 239 pages, price $6.00 (microfiche $1.25).

Mathematics

A RAND MEMORANDUM DIRECTED TO SPECIALISTS IN COMMUNICATION THEORY AND OTHER FIELDS OF APPLIED PROBABILITY THEORY presents new properties of stationary Gaussian processes. The results of the study concern the local behavior of these processes. RAND says the study will be useful in problems in which the local behavior is important, and it also should serve to increase the understanding of applied scientists concerned with engineering analysis. . . M. B. Marcus, RAND Corporation, Santa Monica, Calif., for the Air Force, Oct. 1966. . . Order Stock No. AD-641 323 -- LOCAL BEHAVIOR OF STATIONARY GAUSSIAN PROCESSES, 59 pages, price $3.00 (microfiche 75 cents).

Nuclear Technology

THE DIFFUSION OF PLUTONIUM ISOTOPES IN ANION-EXCHANGE SYSTEMS at chemical and physical equilibrium has been studied by the Los Alamos Scientific Laboratory to expand the knowledge of this complicated diffusional system. A plutonium-239-rich resin phase was contacted with a plutonium-238-rich aqueous phase, and the Pu^{238} concentration in the aqueous phase was measured at timed intervals. Los Alamos found that the diffusion coefficient decreases very rapidly with increasing loading. Its program report qualitatively discusses a diffusional model that is suggested by these results. . . D. B. James and W. A. Beyer, Los Alamos Scientific Laboratory, N. Mex., for the AEC, Sept. 1966. . . Order Stock No. LA-3534 -- PROCESSING OF PLUTONIUM BY ION EXCHANGE, VIII. SELF-DIFFUSION STUDIES IN ANION-EXCHANGE RESIN, 12 pages, price $1.00 (microfiche 50 cents).

A TOTAL OF 520 G OF Pu^{242} HAS BEEN IRRADIATED AT HIGH FLUX in a Savannah River Laboratory reactor to provide the High Flux Isotopes Reactor at Oak Ridge with target material of higher mass. To corroborate the curium yield under irradiation at a flux comparable to that planned for the production of 4.5 kg of Cm^{244}, one target slug of Savannah design, initially containing about 34 g of Pu^{242}, was analyzed after an exposure of 3.7×10^{22} n/cm^2. Chemical analysis of a $Pu^{242}O_2$-Al target slug confirmed the calculated production of Cm^{244} during 20 cycles of irradiation in the high flux charges. The measured yield of Cm^{244} was 0.276 g of Cm^{244} per gram of Pu^{242}. . . E. K. Dukes et al., Savannah River Laboratory, Aiken, S. C., for the AEC, Aug. 1966. . . Order Stock No. DP-1046 -- YIELD OF CURIUM-244 IN THE SRP HIGH FLUX REACTOR, 10 pages, price $1.00 (microfiche 50 cents).

Testing, Analysis

STRESS CAUSED BY HEAT GENERATION IN INFINITE FLAT PLATES has been the subject of investigation by Lawrence Radiation Laboratory scientists who studied the stress analytically and numerically by well-known methods. LRL says the methods can be used to solve multiple-plate problems. The numerical method allows one to consider very high -- even instantaneous -- heat-generation rates, and LRL gives a comparison between the analytical and numerical solutions. LRL arranges the problems in order, from the simple to the more complex. Both the analytical and numerical methods are explained in detail so that an engineer with a minimum of mathematical training can understand the work, use the results, and solve similar problems on his own. . . B. M. Johnston, Lawrence Radiation Laboratory, Livermore, Calif., for the AEC, June 1966. . . Order Stock No. UCRL-14737 -- THERMAL STRESSES IN INFINITE FLAT PLATES, 54 pages, price $3.00 (microfiche 50 cents).

Atmospheric Sciences

TO DEFINE HOW SATELLITE TECHNOLOGY MIGHT BEST BE APPLIED to the furtherance of man's knowledge of the atmosphere, the oceans, and those other factors which combine to make up his total environment, the National Environmental Satellite Center of the Environmental Science Services Administration has compiled a summary of satellite data requirements. ESSA believes the study will give a clearer picture of the possible future applications of orbiting space vehicles, both manned and unmanned, to the environmental sciences. It presents user requirements of which the scientific and operational personnel within ESSA deem necessary in the fulfillment of their mission. The data was gathered from questionnaires submitted to the Environmental Data Service; Hydrography and Oceanography; Institute for Earth Sciences; Institute for Telecommunications, Science and Aeronomy; National Environmental Satellite Center; Office of Science and Engineering; and User Affairs and the Weather Bureau. . . M. A. Ruzecki, Office of System Engineering, National Environmental Satellite Center, ESSA, U. S. Department of Commerce, Washington, D. C., June 1966. . . Order Stock No. PB-173 486 -- NEEDS FOR ENVIRONMENTAL SATELLITES, 118 pages, price $4.00 (microfiche 75 cents).

A MATHEMATICAL MODEL OF THE VERTICAL MOTION OF HIGH ALTITUDE ZERO PRESSURE BALLOONS is sufficiently accurate to predict the vertical motion of the balloons providing the local air temperature profile is known. According to a study made by Arthur D. Little Inc. for the Office of Naval Research, a mathematical model of the vertical motion, programmed for a digital computer, has been in operation for several years and although correlation of input and output data of the program with the measured data of actual flights has been good, it has been incomplete because of the lack of simultaneous measurements of balloon gas and air temperature. Ambient air data, a vital program input, has been questionable due to either the timing or geographical location of an associated radiosonde flight or the local effects which occur when the radiosonde and thermometer are placed near the flight hardware. Since limited information is available on transient gas temperatures, a test flight was conducted to obtain balloon gas and air temperatures. The necessary flight parameters were then used to fly the mathematical model and the output of this digital program, altitude, and gas temperature were compared to the measured values. . . R. M. Lucas and G. H. Hall, Arthur D. Little Inc., Cambridge, Mass., for Office of Naval Research, Oct. 1966. . . Order Stock No. AD-641 332 -- THE MEASUREMENT OF HIGH ALTITUDE BALLOON GAS TEMPERATURE, 31 pages, price $2.00 (microfiche 50 cents).

RESEARCH & DEVELOPMENT REPORTS

1A. AERODYNAMICS

AD-275 107 **Field 1A, 1C, 20D**
CFSTI Price: HC$7.60
Cornell Aeronautical Lab., Buffalo, N. Y.
EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE FLUTTER CHARACTERISTICS OF A MODEL HELLICOPTER ROTOR BLADE IN FORWARD FLIGHT,
by Charles A. Gates, and Frank A. DuWaldt. Feb 62, 76p
Contract AF 33 (616)-7669
Proj. AF-3137
Task 313704
ASD-TR-61-712

Descriptors: (*Model tests, Helicopter rotors), (*Helicopter blades, *Flutter), Stability, Aerodynamics, Lift, Pitch, Mathematical analysis, Analog systems, Analog computers, Tables.

An experimental and analytical investigation was made of the effects of advance ratio on the flutter characteristics of a model helicopter rotor blade. Analyses were based on linearized equations of motion for the flapping, pitching, bending and twisting degrees of freedom although twisting was neglected in the subsequent calculations. Reversed flow effects were included in the evaluation of the aerodynamic forces. Experimental flutter data were obtained by testing a model helicopter rotor blade mounted on the CAL/TRECOM Small Rotorcraft Test Apparatus. These data were compared with the results of calculations based on the linearized equations of motion for pitching, flapping and bending. The trends of the theoretical and experimental results were in fair agreement. Lack of good quantitative agreement is believed to be caused by the absence of an adequate unsteady aerodynamic theory. (Author)

AD-641 371 **Field 1A, 1C**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Flight Test Center, Edwards AFB, Calif.
IMPORTANT VSTOL AIRCRAFT STABILITY DERIVATIVES IN HOVER AND TRANSITION.
Final rept.,
by J. M. Rampy. Oct 66, 27p FTC-TR-66-29

Descriptors: (*Vertical take-off planes, Stability), (*Aerodynamic characteristics, Vertical take-off planes), Hovering, Flight, Simulators, Mathematical analysis, Motion, Test facilities.

To design better ground test facilities and to specify handling qualities criteria, the aerodynamic parameters involved must be identified. The purpose of the study was to identify these parameters for the critical flight regime of hover through transition. Both analog and digital computers were used. The purpose of the analog simulation was to qualitatively analyze the behavior of VSTOL aircraft to control inputs and identify the most important derivatives. Two typical VSTOL aircraft were investigated. The method used to determine the important derivatives was that of varying the stability derivatives about some basic value. The amount of simulator response identified the most important derivatives. Next, the digital computer was used to affix a magnitude to the relative importance of each derivative. To establish the relative importance, a sensitivity factor was derived. The information necessary to calculate this factor was obtained from a mathematical analysis of the equations of motion. The important derivatives were identified for both longitudinal and lateral-directional motion. (Author)

N66-33015 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
ROUGHNESS EFFECTS ON BOUNDARY-LAYER TRANSITION FOR BLUNT-LEADING-EDGE PLATES AT MACH 6.
by P. F. Holloway, and E. L. Morrisette. Aug 66, 42p NASA-TN-D-3517

Descriptors: *Blunt body, *Boundary layer transition, *Flat plate, *Free stream, *Surface roughness, Blunt, Body, Boundary, Flat, Free, Heating, Layer, Plate, Reynolds number, Roughness, Stream, Surface, Transition, Upswept.

For abstract, see STAR 04 19.

N66-33017 **Field 1A**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
HYPERSONIC LAMINAR VISCOUS INTERACTION EFFECTS ON THE AERODYNAMICS OF TWO-DIMENSIONAL WEDGE AND TRIANGULAR PLANFORM WINGS.
by M. H. Bertram. Aug 66, 86p NASA-TN-D-3523

Descriptors: *Hypersonic flow, *Viscous drag, *Wedge, *Wing planform, Aerodynamics, Boundary, Dimensional, Drag, Flow, Heat, Hypersonic, Interaction, Laminar, Layer, Planform, Specific, Triangle, Two, Viscous, Wing.

For abstract, see STAR 04 19.

N66-33018 **Field 1A**
CFSTI Prices HC$4.00 MF$1.00
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
STAGNATION AND STATIC PRESSURES ON A NOSE-MOUNTED 15 DEG CONICAL PROBE WITH VARIOUS FOREBODY CONFIGURATIONS.
by E. M. Coates Jr. Aug 66, 118p NASA-TN-D-3526

Descriptors: *Pressure distribution, *Transonic speed, *X- 15 aircraft, Aircraft, Calibration, Configuration, Conical, Data, Distribution, Forebody, Pressure, Probe, Speed, Stagnation, Static, Subsonic, Transonic.

For abstract, see STAR 04 19.

N66-33306 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
WIND-TUNNEL INVESTIGATION AT A MACH NUMBER OF 2.91 OF STABILITY AND CONTROL CHARACTERISTICS OF THREE LIFTING REENTRY CONFIGURATIONS AT ANGLES OF ATTACK UP TO 90 DEGREES.
by J. E. Grimaud. Mar 61, 42p NASA-TM-X-455

Descriptors: *Angle of attack, *Reentry vehicle, *Stability and control, *Wind tunnel, Atmosphere, Control, Earth, Fin, Lift, Longitudinal, Mach number, Model, Stability, Trim, Tunnel, Wind.

For abstract, see STAR 04 19.

N66-33310 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
BOUNDARY-LAYER-TRANSITION AND HEAT-TRANSFER MEASUREMENTS FROM FLIGHT TESTS OF BLUNT AND SHARP 50 DEGREE CONES AT MACH NUMBERS FROM 1.7 TO 4.7.
by L. T. Chauvin, and K. C. Speegle. 18 Apr 57, 43p NACA-RM-L57D04

Descriptors: *Blunt body, *Boundary layer transition, *Cone, *Turbulent heat transfer, Angle, Apex, Blunt, Body, Boundary, Flight, Flow, Heat transfer, Laminar, Layer, Sharp, Test, Transition, Turbulent.

For abstract, see STAR 04 19.

N66-33312 **Field 1A**
CFSTI Prices HC$3.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
ADDITIONAL EXPERIMENTS WITH FLAT-TOP WING- BODY COMBINATIONS AT HIGH SUPERSONIC SPEEDS.
by H. R. Gloria, C. A. Syvertson, and T. J. Wong. 19 Feb 57, 52p NACA-RM-A56I11

Descriptors: *Aerodynamic characteristics, *Aircraft design, *Supersonic aircraft, *Wing body, Aerodynamic, Aircraft, Body, Characteristics, Control, Design, Drag, Edge, Fin, Leading, Lift, Longitudinal, Pitch, Speed, Stability, Static, Supersonic, Trailing, Wing.

For abstract, see STAR 04 19.

N66-33313 **Field 1A**
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National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
DYNAMIC STABILITY INVESTIGATION OF TWO RIGHT CIRCULAR CYLINDERS IN AXIAL FREE FLIGHT AT MACH NUMBERS FROM 0.4 TO 1.7 FINENESS-RATIO- 2.56 CYLINDER AND FINENESS-RATIO-4.0 CYLINDER WITH FLARED AFTERBODY.
by J. C. Mc fall Jr. 28 Feb 57, 48p NACA-RM-L56L28

Descriptors: *Circular cylinder, *Dynamic stability, *Free flight, *Longitudinal stability, Afterbody, Axial, Body, Booster, Circular, Cylinder, Dynamic, Fineness, Flare, Free, Longitudinal, Mach number, Model, Ratio, Reynolds number, Right, Rocket, Stability.

For abstract, see STAR 04 19.

N66-33316 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
SUBSONIC AERODYNAMIC CHARACTERISTICS OF PYRAMIDAL RE-ENTRY SHAPES INCORPORATING VARIABLE GEOMETRY.
by J. J. Brownson, and F. A. Demele. Jan 62, 38p NASA-TM-X-645

Descriptors: *Aerodynamic characteristics, *Pyramidal body, *Reentry body, *Subsonic speed, Aerodynamic, Blunt, Body, Characteristics, Cross section, Geometry, Pyramid, Rectangle, Reentry, Speed, Square, Structure, Subsonic, Variable, Variable geometry structure.

For abstract, see STAR 04 19.

N66-33321 **Field 1A**
CFSTI Prices HC$3.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF A 60 DEGREE SWEPTBACK-WING AIRPLANE CONFIGURATION HAVING TAIL SURFACES LOCATED OUTBOARD OF THE WING TIPS AT MACH NUMBERS OF 2.30, 2.97, 3.51, AND 4.06.
by J. D. Church, R. H. Fournier, and W. C. Sleeman Jr. Mar 60, 54p NASA-TM-X-219

Descriptors: *Supersonic speed, *Sweptback wing, Aerodynamic, Aerodynamic characteristics, Characteristics, Drag, Lateral, Longitudinal, Speed, Stability, Static, Supersonic, Sweep, Sweepback, Trim, Wing.

For abstract, see STAR 04 19.

N66-33323 **Field 1A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.

TRANSONIC WIND-TUNNEL MEASUREMENTS OF SOME DYNAMIC LONGITUDINAL AND DIRECTIONAL STABILITY PARAMETERS FOR A FINNED SPINNING BODY OF REVOLUTION HAVING A HIGH FINENESS RATIO.
by W. C. Hayes Jr, and R. A. Kilgore. Oct 61, 20p NASA-TM-X-594

Descriptors: *Body of revolution, *Directional stability, *Dynamic stability, *Fineness ratio, *Longitudinal stability, *Transonic speed, Body, Damping, Direction, Dynamic, Fineness, High, Longitudinal, Pitch, Ratio, Revolution, Speed, Spin, Stability, Transonic, Yaw.

For abstract, see STAR 04 19.

N66-33324 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
SUPERSONIC AERODYNAMIC CHARACTERISTICS OF TRIANGULAR PLAN-FORM MODELS AT ANGLES OF ATTACK TO 90 DEGREES.
by G. E. Kaattari, and L. E. Wiggins. Jul 61, 46p NASA-TM-X-568

Descriptors: *Aerodynamic characteristics, *Planform, *Supersonic speed, *Triangular wing, Aerodynamic, Characteristics, Coefficient, Drag, Lift, Model, Moment, Pitch, Ratio, Speed, Supersonic, Sweep, Triangle, Wing.

For abstract, see STAR 04 19.

N66-33326 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
AN EXPERIMENTAL INVESTIGATION OF AERODYNAMIC EFFECTS OF AIRFOIL THICKNESS ON TRANSONIC FLUTTER CHARACTERISTICS.
by R. V. Doggett Jr, H. G. Morgan, and A. G. Rainey. Nov 59, 28p NASA-TM-X-79

Descriptors: *Aerodynamic stability, *Airfoil thickness, *Swept wing, *Transonic flutter, *Unswept wing, Aerodynamic, Aeroelasticity, Aileron, Airfoil, Aspect, Density, Effect, Fluid, Flutter, Mach number, Mass, Ratio, Stability, Stiffness, Sweep, Thickness, Transonic, Unswept, Vibration, Wing.

For abstract, see STAR 04 19.

N66-33327 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
PRESSURE DISTRIBUTIONS ON A FLAT-PLATE DELTA WING SWEPT 65 DEG AT A MACH NUMBER OF 5.97 AT ANGLES OF ATTACK FROM 65 DEG TO 115 DEG AND ANGLES OF ROLL FROM 0 DEG TO 25 DEG AT A 90 DEG ANGLE OF ATTACK.
by T. J. Goldberg, and J. G. Hondros. Aug 62, 31p NASA-TM-X-702

Descriptors: *Angle of attack, *Delta wing, *Flat plate, *Hypersonic speed, *Pressure distribution, *Swept wing, Aerodynamics, Blowdown, Delta, Distribution, Edge, Flat, Hypersonic, Load, Planform, Plate, Point, Pressure, Reynolds number, Roll, Speed, Stagnation, Stress, Surface, Sweep, Trailing, Tunnel, Wind, Wing.

For abstract, see STAR 04 19.

N66-33328 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
TRANSONIC FLUTTER INVESTIGATION OF MODELS OF PROPOSED HORIZONTAL TAILS FOR THE X-15 AIRPLANE.
by L. S. Young. Feb 61, 41p NASA-TM-X-442

Descriptors: *Flutter analysis, *Horizontal tail, *Scale model, *Transonic flutter, *X- 15 aircraft, Aerodynamic, Analysis, Distribution, Dynamic, Elastic, Flutter, Heating, Horizontal, Mass, Model, Moving, Panel, Pitch, Pressure, Safety, Scale, Standard, Stiffness, Tail, Temperature, Transient, Transonic.

For abstract, see STAR 04 19.

N66-33329 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
TRANSONIC FLUTTER INVESTIGATION OF MODELS OF THE X-15 AIRPLANE HORIZONTAL TAIL.
by S. R. Bland, and L. S. Young. Feb 61, 38p NASA-TM-X-447

Descriptors: *Flutter analysis, *Horizontal tail, *Scale model, *Sweptback tail surface, *Transonic flutter, *X- 15 aircraft, Analysis, Blowdown, Dynamic, Elastic, Flutter, Horizontal, Moving, Surface, Sweepback, Tail, Taper, Transonic, Tunnel, Wind.

For abstract, see STAR 04 19.

N66-33331 **Field 1A**
CFSTI Prices HC$2.50 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
INVESTIGATION OF AERODYNAMIC CHARACTERISTICS OF AN AIRPLANE CONFIGURATION HAVING TAIL SURFACES OUTBOARD OF THE WING TIPS AT MACH NUMBERS OF 2.30, 2.97, AND 3.51.
by J. D. Church, W. C. Hayes Jr, and W. C. Sleeman Jr. 23 Jun 58, 52p NACA-RM-L58C25

Descriptors: *Aerodynamic characteristics, *Aircraft configuration, *Supersonic speed, *Tail surface, *Wind tunnel stability test, *Wing tip, Aerodynamic, Aircraft, Characteristics, Configuration, Drag, Outboard, Reynolds number, Speed, Stability, Supersonic, Surface, Tail, Test, Tip, Trim, Tunnel, Wind, Wing.

For abstract, see STAR 04 19.

N66-33336 **Field 1A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
LOW-SPEED INVESTIGATION OF EFFECTS OF VERTICAL TAILS ON THE STATIC STABILITY CHARACTERISTICS OF A CANARD-BOMBER CONFIGURATION HAVING A VERY THIN WING AND A SLENDER ELLIPTICAL FUSELAGE.
by T. G. Gainer. Jan 61, 24p NASA-TM-X-436

Descriptors: *Bomber aircraft, *Canard, *Fuselage, *Static stability and control, *Vertical tail, *Wing tip control, Aerodynamics, Aircraft, Airfoil, Angle of attack, Bomber, Characteristics, Configuration, Control, Cross section, Ellipse, Low speed, Low speed stability, Slender, Stability, Static, Tail, Tip, Vertical, Wing.

For abstract, see STAR 04 19.

N66-33338 **Field 1A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
MEASUREMENTS OF THE MACH NUMBER AND PRESSURE ON THE AFTERBODY OF A BLUNT-NOSED MODEL IN FREE FLIGHT AT MACH NUMBERS FROM 6.5 TO 14.
by S. C. Sommer. Apr 60, 16p NASA-TM-X-360

Descriptors: *Afterbody, *Blunt body, *Hypersonic speed, *Mach number, *Pressure measurement, Aerodynamic, Blunt, Body, Drag, Flight, Flow, Free, Free flight, Heating, Hypersonic, Local, Measurement, Model, Nose, Pressure, Shock, Speed, Stability, Static, Stream, Test, Tunnel, Wave, Wind.

For abstract, see STAR 04 19.

N66-33339 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
INVESTIGATION OF HIGH-ANGLE-OF-ATTACK PERFORMANCE OF A 14 DEG RAMP-TYPE INLET IN VARIOUS CIRCUMFERENTIAL BODY LOCATIONS, MACH NUMBER RANGE 1.5 TO 2.0.
by B. G. Chiccine, and G. A. Mitchell. 26 Jun 57, 38p NACA-RM-E57C12A

Descriptors: *Angle of attack, *Free stream, *Inlet flow, *Supersonic flow, Bleed, Boundary layer, Distortion, Flow, Free, Fuselage, High angle, Inlet, Internal, Mach number, Pressure, Ramp, Recovery, Stability, Stream, Supersonic, Throat, Zero.

For abstract, see STAR 04 19.

N66-33340 **Field 1A**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
THE AERODYNAMIC CHARACTERISTICS OF SEVERAL THICK DELTA WINGS AT MACH NUMBERS TO 6 AND ANGLES OF ATTACK 50 DEG.
by J. B. Mc devitt, and J. V. Rakich. Mar 66, 111p NASA-TM-X-162

Descriptors: *Aerodynamic characteristics, *Angle of attack, *Delta wing, *Hypersonic speed, *Subsonic speed, Aerodynamic, Atmosphere, Blunt, Body, Characteristics, Compressible, Cone, Control, Delta, Design, Ellipse, Entry, Flow, Glider, High, Hypersonic, Longitudinal, Shape, Speed, Stability, Subsonic, Thickness, Wing.

For abstract, see STAR 04 19.

N66-33343 **Field 1A**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF MODIFICATIONS TO A CONTROL SURFACE ON A 6-PERCENT-THICK UNSWEPT WING ON THE TRANSONIC CONTROL-SURFACE FLUTTER DERIVATIVES.
by B. J. Gambucci, R. M. Sorenson, and J. A. Wyss. 2 May 58, 69p NACA-RM-A58B04

Descriptors: *Control surface, *Flutter analysis, *Pressure measurement, *Transonic flutter, *Unswept wing, Aerodynamic, Analysis, Cell, Chord, Control, Damping, Derivative, Dynamic, Elevator, Flap, Flutter, Hinge, Measurement, Moment, Pressure, Shock, Surface, Transonic, Triangle, Unswept, Vibration, Wave, Wedge, Wing.

For abstract, see STAR 04 19.

N66-33347 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
AN EXPLORATORY INVESTIGATION OF A TRANSPORT CONFIGURATION DESIGNED FOR SUPERSONIC CRUISE FLIGHT NEAR A MACH NUMBER OF 3.
by M. M. Carmel, A. B. Carraway, and D. T. Gregory. Mar 60, 39p NASA-TM-X-216

Descriptors: *Aerodynamic characteristics, *Supersonic transport, *Wind tunnel model,

Aerodynamic, Aircraft, Characteristics, Configuration, Direction, Drag, Lateral, Lift, Longitudinal, Model, Stability, Supersonic, Transport, Tunnel, Wind.

For abstract, see STAR 04 19.

N66-33349 **Field 1A**
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National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
FORCE AND PRESSURE-DISTRIBUTION INVESTIGATION TO HIGH ANGLES OF ATTACK ON ALL-MOVABLE TRIANGULAR AND RECTANGULAR WINGS IN COMBINATION WITH A BODY AT SUPERSONIC SPEEDS.
by W. A. Hill Jr, and G. E. Kaattari. 10 Jul 56, 179p NACA-RM-A56C12

Descriptors: *Angle of attack, *Pressure distribution, *Rectangular wing, *Supersonic speed, *Triangular wing, *Wing loading, Body, Distribution, Loading, Moving, Pressure, Rectangle, Speed, Supersonic, Surface, Testing, Triangle, Tunnel, Wind, Wing.

For abstract, see STAR 04 19.

N66-33447 **Field 1A**
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National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
PRESSURE DISTRIBUTIONS DUE TO TWO-DIMENSIONAL FABRICATION-TYPE SURFACE ROUGHNESS ON AN OGIVE CYLINDER AT TRANSONIC SPEEDS.
by K. R. Czarnecki, and W. J. Monta. Aug 66, 81p NASA-TN-D-3516

Descriptors: *Cylinder, *Ogive, *Pressure distribution, *Surface roughness, *Transonic speed, Boundary, Dimensional, Distribution, Fabrication, Layer, Mach number, Pressure, Roughness, Speed, Surface, Transonic, Two.

For abstract, see STAR 04 19.

N66-33449 **Field 1A**
CFSTI Prices HC$3.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
PRESSURE DRAGS DUE TO TWO-DIMENSIONAL FABRICATION-TYPE SURFACE ROUGHNESS ON AN OGIVE CYLINDER AT TRANSONIC SPEEDS.
by K. R. Czarnecki, and W. J. Monta. Aug 66, 57p NASA-TN-D-3519

Descriptors: *Cylinder, *Ogive, *Pressure drag, *Surface roughness, *Transonic speed, Boundary, Dimensional, Drag, Layer, Mach number, Pressure, Roughness, Speed, Surface, Transonic, Turbulent, Two.

For abstract, see STAR 04 19.

N66-33451 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
SUPERSONIC INVESTIGATION OF EFFECTS OF CONFIGURATION GEOMETRY ON PRESSURE-COEFFICIENT AND SECTION NORMAL-FORCE-COEFFICIENT DISTRIBUTIONS FOR A TWO-STAGE LAUNCH VEHICLE.
by J. A. Blackwell Jr. Aug 66, 45p NASA-TN-D-3408

Descriptors: *Force distribution, *Geometric factor, *Launch vehicle configuration, *Supersonic pressure distribution, Coefficient, Configuration, Distribution, Factor, Force, Geometry, Normal, Pressure, Section, Stage, Static, Study, Supersonic, Tunnel, Two, Wind.

For abstract, see STAR 04 19.

N66-33452 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF A TENSION SHELL ENTRY CONFIGURATION AT MACH 20.
by T. R. Creel Jr. Aug 66, 30p NASA-TN-D-3541

Descriptors: *Aerodynamic characteristics, *Mach number, *Shell, *Spacecraft configuration, *Tension, Aerodynamic, Angle, Attack, Axial, Characteristics, Coefficient, Configuration, Distribution, Drag, Entrance, Force, Longitudinal, Pressure, Spacecraft.

For abstract, see STAR 04 19.

N66-33453 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
STATIC STABILITY CHARACTERISTICS OF CONE AND HALF-CONE-PYRAMID CONFIGURATIONS AT MACH 6.83.
by P. T. Bernot, and B. C. Jordan. Aug 66, 33p NASA-TN-D-3544

Descriptors: *Half-cone, *Longitudinal stability, *Pyramidal body, *Static stability, Body, Characteristics, Cone, Configuration, Friction, Half, Longitudinal, Mach number, Pyramid, Rectangle, Skin, Stability, Static, Wing.

For abstract, see STAR 04 19.

N66-33457 **Field 1A**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
SUPERSONIC AERODYNAMIC CHARACTERISTICS OF A SERIES OF RELATED BODIES WITH CROSS-SECTIONAL ELLIPTICITY.
by W. A. Corlett, R. H. Fournier, and B. Spencer Jr. Aug 66, 61p NASA-TN-D-3539

Descriptors: *Aerodynamic characteristics, *Ellipticity, *Lifting body, Aerodynamic, Angle, Attack, Body, Characteristics, Cross section, Drag, Lifting, Mach number, Series, Supersonic, Tunnel, Wave, Wind.

For abstract, see STAR 04 19.

N66-33486 **Field 1A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
SUPERSONIC AERODYNAMIC CHARACTERISTICS OF A SATURN IB LAUNCH VEHICLE MODEL WITH THIRD-STAGE MODIFICATIONS.
by R. H. Fournier. Aug 66, 19p NASA-TM-X-1247

Descriptors: *Aerodynamic characteristics, *Apollo spacecraft, *Saturn ib launch vehicle, Aerodynamic, Angle, Characteristics, Cone, Escape, Launch vehicle, Longitudinal, Pitch, Spacecraft, Stability, Stage, Test, Third, Tower, Tunnel, Wind.

For abstract, see STAR 04 19.

N66-33693 **Field 1A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
HEAT TRANSFER IN THE NEIGHBORHOOD OF THE BLUNT LEADING EDGE OF A CYLINDRICAL WING DURING SLIP.
Teploobmen V Okrestnosti Tupoy Peredney Kromki Tsilindricheskogo Kryla Pri Skol'zhenii
by A. A. Yarkho. Jun 66, 14p NASA-TT-F-10218
Transl. Into English From Izv. Vysshikh Uchebn. Zaved., Ser. Aviats. Tekh. (Kazan), No. 3, 1960 P 22-27

Descriptors: *Heat transfer, *Leading edge, *Slip, Blunt, Cylinder, Edge, Flow, Gas, Laminar, Leading, Prandtl number, Stationary, Temperature, Thermodynamics, Wing.

For abstract, see STAR 04 19.

N66-34079 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
A NOTE ON THE ABILITY TO PREDICT TRANSONIC DRAG-RISE CHANGES DUE TO MODEL MODIFICATIONS.
by P. K. Pierpont. 3 Oct 57, 35p NACA-RM-L57H07

Descriptors: *Drag, *Fourier analysis, *Transonic speed, Aerodynamic, Agreement, Analysis, Body, Calculation, Configuration, Measurement, Method, Speed, Tail, Test, Transonic, Wind tunnel, Wing.

For abstract, see STAR 04 19.

N66-37641 **Field 1A**
CFSTI Prices HC$2.50 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
A STUDY OF DAMPING IN NONLINEAR OSCILLATIONS.
by D. B. Kirk, and M. L. Rasmussen. Oct 66, 54p NASA-TR-R-249

Descriptors: *Damping, *Nonlinear system, *Oscillation, Cubic, Differential, Distortion, Equation, Integral, Linear, Moment, Perturbation, Static.

For abstract, see STAR 04 23.

N66-37677 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
AERODYNAMIC CHARACTERISTICS OF TENSION SHELL SHAPES AT MACH 3.0.
by W. D. Deveikis, and J. W. Sawyer. Oct 66, 52p NASA-TN-D-3633

Descriptors: *Aerodynamic characteristics, *Shell, *Supersonic speed, Aerodynamic, Axisymmetry, Braking, Catenary, Configuration, Flow, Force, Measurement, Model, Moment, Pattern, Photography, Pitch, Schlieren, Shape, Shock, Tension, Tunnel, Wave, Wind.

For abstract, see STAR 04 23.

N66-38136 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
LOW-SUBSONIC WIND-TUNNEL AND FREE-FLIGHT DROP-TEST INVESTIGATION OF A PARAGLIDER CONFIGURATION HAVING LARGE TAPERED LEADING EDGES AND KEEL.
by D. P. Croom, and P. G. Fournier. Oct 66, 35p NASA-TN-D-3442
Film Supplement Number L-906 To This Report Is Available On Loan From Langley Res. Center

Descriptors: *Aerodynamic characteristics, *Drop test, *Inflatable glider, *Paraglider, *Subsonic wind tunnel, Edge, Flight, Free, Keel, Lateral, Leading, Longitudinal, Model, Parawing, Performance, Stability, Taper, Test.

For abstract, see STAR 04 23.

N66-38365 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.

A WIND-TUNNEL INVESTIGATION OF THE DYNAMIC STABILITY OF AXISYMMETRIC MODELS WITH HAMMERHEAD NOSES IN TRANSONIC FLOW.
by R. C. Robinson. Apr 63, 29p NASA-TM-X-787

Descriptors: *Axisymmetric body, *Dynamic stability, *Hammerhead configuration, *Transonic wind tunnel, Aerodynamic, Angle, Angle of attack, Boattail, Damping, Effect, Flow, Fluctuation, Force, Free, Launch, Load, Mean, Measurement, Method, Model, Nose, Oscillation, Pressure, Shape, Space, Vehicle.

For abstract, see STAR 04 23.

N66-38407 **Field 1A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
A NUMERICAL TECHNIQUE FOR ANALYSIS OF WAVE DRAG AT LIFTING CONDITIONS.
by R. V. Harris Jr. Oct 66, 13p NASA-TN-D-3586, NASA-SP-124
Contract 126-13-03-22-23
Presented At The Conf. On Aircraft Aerodyn., Nasa. Langley Res. Center, 23-25 May 1966 Previously Announced In Nasa-sp-124, See X66-20041 17-01

Descriptors: *Lift force, *Supersonic aircraft, *Wave drag, Analysis, Condition, Far, Field, Flow, Lifting, Linear, Numerical, Supersonic, Theory.

For abstract, see STAR 04 23.

N66-38421 **Field 1A**
CFSTI Prices HC$2.50 MF$0.75
Douglas Aircraft Co., Inc., Long Beach, Calif.
A FEASIBILITY INVESTIGATION CONCERNING THE SIMULATION OF SONIC BOOM BY BALLISTIC MODELS.
by J. G. Callaghan. Oct 66, 97p NASA-CR-603
Contract NAS1-5149

Descriptors: *Simulation, *Sonic boom, *Test program, Ballistics, Body, Instrumentation, Model, Pressure, Transducer, Winged.

For abstract, see STAR 04 23.

N66-38424 **Field 1A**
CFSTI Prices HC$2.50 MF$0.75
Bolt, Beranek, And Newman, Inc., Los Angeles, Calif.
A REVIEW OF FLIGHT AND WIND TUNNEL MEASUREMENTS OF BOUNDARY LAYER PRESSURE FLUCTUATIONS AND INDUCED STRUCTURAL RESPONSE.
by D. A. Bies. Oct 66, 95p NASA-CR-626
Contract NAS1-5120

Descriptors: *Boundary layer, *Pressure oscillation, *Vibration measurement, Acceleration, Aerodynamics, Flat, Flight, Fluctuation, Measurement, Panel, Pressure, Response, Structural, Tunnel, Wind.

For abstract, see STAR 04 23.

N66-38487 **Field 1A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AERODYNAMICS RESEARCH AT MSFC.
by E. D. Geissler. 1965, 49p NASA-TM-X-53501
Its Research Achievements Review Series No. 12

Descriptors: *Aerodynamics, *Base heating, *Rarefied gas dynamics, *Turbulent flow, Beam, Crossed, Flow, Jet, Launch vehicle, Method, Nose, Optical, Penetration, Porosity, Pressure, Probe, Research, Shape, Unsteady.

For abstract, see STAR 04 23.

N66-38716 **Field 1A**
CFSTI Prices HC$5.00 MF$1.00
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
A THEORETICAL AND EXPERIMENTAL STUDY AT MACH 8 OF FLOW SEPARATION OF A FLAT PLATE WITH DEFLECTED TRAILING EDGE FLAP.
by C. B. Johnson. Aug 66, 168p NASA-TM-X-57968

Descriptors: *Deflection, *Flat plate, *Flow separation, *Mach number, Angle, Boundary, Flap, Flat, Flow, Layer, Plate, Pressure, Reynolds number, Schlieren, Separation, Shock, Temperature, Wall.

For abstract, see STAR 04 23.

N66-38727 **Field 1A**
CFSTI Prices HC$3.00 MF$0.75
Wyle Labs., Inc., Huntsville, Ala. Testing Div.
RESPONSE OF PANELS TO OSCILLATING SHOCK WAVES.
by M. J. Crocker. Mar 66, 75p NASA-CR-78556, WR-66-17
Contract NAS8-20073-1
Prepared For Brown Eng. Co.

Descriptors: *Oscillation, *Panel, *Shock wave, *Structural vibration, Behavior, Calculation, Computer, Logic, Mathematics, Model, Program, Response, Shock, Vibration.

For abstract, see STAR 04 23.

N66-38749 **Field 1A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
AN INTEGRATED APPROACH TO THE ANALYSIS AND DESIGN OF WINGS AND WING-BODY COMBINATIONS IN SUPERSONIC FLOW.
by R. L. Carmichael, and F. A. Woodward. Oct 66, 15p NASA-TN-D-3685
Contract 126-13-02-12

Descriptors: *Numerical analysis, *Supersonic flow, *Wing body, Arbitrary, Camber, Constraint, Design, Drag, Integration, Lift, Loading, Minimum, Moment, Numerical, Planform, Procedure, Shape, Warp, Wing.

For abstract, see STAR 04 23.

N66-38804 **Field 1A**
CFSTI Prices HC$2.50 MF$0.75
Ling-temco-vought, Inc., Dallas, Tex.
EFFECTS OF PERIODIC BLOWING THROUGH FLUSH TRANSVERSE SLOTS ON TURBULENT BOUNDARY LAYER SKIN FRICTION.
by J. G. Spangler. Oct 66, 69p NASA-CR-634
Contract NASW-956

Descriptors: *Blowing, *Skin friction drag, *Slot, *Turbulent boundary layer, Air, Effect, Flush, Frequency, Jet, Measurement, Periodic, Power, Profile, Pulse, Transverse, Velocity.

For abstract, see STAR 04 23.

AD-134 400 **See Field 201**

1B. AERONAUTICS

AD-102 896 **Field 1B**
CFSTI Price: HC$1.60
RAND Corp., Santa Monica, Calif.
A STUDY TO DETERMINE THE FLIGHT PATHS WHICH REQUIRE MINIMUM TIME AND MINIMUM FUEL FOR A TYPICAL PRESENT DAY INTERCEPTOR,
by T. F. Kirkwood. 15 Sep 49, 20p RM-246
Contract AF 33 (038)-6413

Descriptors: (*Flight paths, *Jet fighters), Mathematical analysis, Tests.

An approximate method is presented for finding the flight technique by which an airplane may reach a specified speed and altitude in the minimum time or with the minimum fuel consumed. Both the case in which the distance covered is unrestricted and in which a specified distance is covered are considered. It is found, that if the final altitude is sufficiently far above the initial, a large portion of the optimum path is independent of the specified initial and final speeds and altitudes. Simple equations are found for this portion of the path. No equations are found describing the transition from the initial speed and altitude to this central portion of the path or from the central portion to the final speed and altitude. However, some information regarding the best transition technique is found from a consideration of several arbitrarily selected transition paths. (Author)

AD-641 332 **Field 1B**
CFSTI Prices: HC$2.00 MF$0.50
Little (Arthur D.), Inc., Cambridge, Mass.
THE MEASUREMENT OF HIGH ALTITUDE BALLOON GAS TEMPERATURE.
Technical rept.,
by R. M. Lucas, and G. H. Hall. Oct 66, 31p TR-5, C-62944
Contract Nonr-3164 (00)

Descriptors: (*Balloons, High altitude), (*Gases, Temperature), Measurement, Atmospheric temperature, Mathematical models, Motion, Mathematical prediction, Helium, Thermistors, Correlation techniques, Flight paths.

A mathematical model of the vertical motion of high altitude zero pressure balloons, programmed for a digital computer, has been in operation for several years. Correlation of input and output data of the program with the measured data of actual flights has been good, but incomplete, because of the lack of simultaneous measurements of balloon gas and air temperature. A test flight was conducted to obtain balloon gas and air temperatures. The necessary flight parameters were then used to fly the mathematical model and the output of this digital program, altitude, and gas temperature, were compared to the measured values. The resulting correlation indicate that the mathematical model is sufficiently accurate to predict the vertical motion of high altitude balloons providing the local air temperature profile is known. A preliminary test program was conducted to evaluate the thermistor characteristics, to provide the necessary calibrations, and determine the possible measuring errors. (Author)

AD-641 478 **Field 1B, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Federal Aviation Agency, Washington, D. C. Aeromedical Applications Div.
PROTECTING THE AG PILOT,
by Stanley R. Mohler, and Charles R. Harper. Sep 66, 12p
AM-66-30

Descriptors: (*Aviation accidents, Poisons), Pesticides, Airborne, Poisoning, Aviation safety, Shock (Pathology), Impact shock, Therapy, Aviation medicine.

Summarized data resulting from a detailed review of fatal and non-fatal aerial applicator accidents are presented with an analysis of the factors underlying the accidents. The role of toxic substance is evaluated. Preventive and newer therapeutic approaches are given. (Author)

N66-33314 **Field 1B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
EFFECTS OF WING-FUSELAGE FLOW FIELDS ON MISSILE LOADS AT SUBSONIC SPEEDS.
by W. J. Alford Jr. 27 Jun 55, 19p NACA-RM-L55E10A

Descriptors: *Flow field, *Missile, *Subsonic speed, *Swept wing, *Wing-fuselage combination, Characteristics, Combination, Field, Flow, Fuselage, Load, Longitudinal, Speed, Stability, Subsonic, Sweep, Wing.

For abstract, see STAR 04 19.

N66-33330 **Field 1B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Flight Research Center, Edwards, Calif.
FLIGHT SIMULATED OFF-THE-PAD ESCAPE AND LANDING MANEUVERS FOR A VERTICALLY LAUNCHED HYPERSONIC GLIDER.
by N. A. Armstrong, W. H. Dana, and G. J. Matranga. Mar 62, 27p NASA-TM-X-637

Descriptors: *Flight simulation, *Hypersonic glider, *Landing simulation, *Launching pad, *Pilot performance, *Safety factor, *Vertical takeoff, Cockpit, Delta, Escape, Factor, Flight, Glider, Hypersonic, Landing, Launching, Maneuver, Pad, Performance, Pilot, Safety, Simulation, Subsonic, Takeoff, Vertical, Visibility, Wing.

For abstract, see STAR 04 19.

N66-33437 **Field 1B**
CFSTI Prices HC$1.00 MF$0.50
New York Univ., N. Y. Dept. Of Meteorology And Oceanography.
PROJECT HIAM INFORMAL REPORT, DEC. 1965 - MAY 1966.
by W. E. Mc govern. 1966, 21p NASA-CR-77048
Grant NSG-499

Descriptors: *Astrophysics, *Atmospheric scattering, *Earth albedo, *Geophysics, *Planetary atmosphere, Acid, Aerosol, Albedo, Ammonium, Atmosphere, Budget, Cloud, Concentration, Constant, Degradation, Earth, Emission, Heat, Mars (planet), Mercury (planet), Optical, Ozone, Planetary, Radiation, Radiometer, Sulfate, Sulfuric, Tiros vii satellite, Venus.

For abstract, see STAR 04 19.

N66-33489 **Field 1B**
CFSTI Prices HC$2.50 MF$0.75
Advisory Group For Aerospace Research And Development, Paris (France).
PROBLEMS ASSOCIATED WITH THE PRESENCE OF WATER, SLUSH, SNOW AND ICE ON RUNWAYS.
by H. R. Herb. 1965, 65p AGARD-500

Descriptors: *Ice, *Runway condition, *Snow, *Water, Aircraft, Coefficient, Condition, Distance, Friction, Landing, Runway, Slush, Surface, Takeoff, Tire.

For abstract, see STAR 04 19.

N66-34078 **Field 1B**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
FLIGHT MEASUREMENTS OF SOME OF THE FLYING QUALITIES AND STABILITY DERIVATIVES OF A SUPERSONIC FIGHTER AIRPLANE.
by R. A. Champine, C. C. Kraft Jr, M. D. Mc laughlin, and J. A. White. Dec 58, 85p NASA-MEMO-10-7-58L

Descriptors: *Dynamic stability, *Fighter aircraft, *Flight test, *Flying quality, *Supersonic aircraft, Aircraft, Dynamic, Fighter, Flight, Flying, Quality, Speed, Stability, Supersonic, Test.

For abstract, see STAR 04 19.

N66-34081 **Field 1B**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
A SUMMARY OF RESULTS OBTAINED DURING FLIGHT SIMULATION OF SEVERAL AIRCRAFT PROTOTYPES WITH VARIABLE-STABILITY AIRPLANES.
by B. Y. Creer, and W. E. Mc neill. 25 May 56, 68p NACA-RM-A56C08

Descriptors: *Dynamic stability, *F- 86 aircraft, *Flight simulation, *Lateral stability, Aircraft, Design, Direction, Dynamic, Flight, Lateral, Pilot, Prototype, Servo, Simulation, Stability, Test.

For abstract, see STAR 04 19.

N66-38138 **Field 1B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
GROUND EFFECTS RELATED TO LANDING OF AIRPLANES WITH LOW-ASPECT-RATIO WINGS.
by W. B. Kemp Jr, V. E. Lockwood, and W. P. Phillips. Oct 66, 16p NASA-TN-D-3583, NASA-SP-124
Contract 126-13-03-22-23
Presented At Conf. On Aircraft Aerodyn., Langley Station, Va., 23-25 May 1966 Previously Published In Nasa Sp-124, See X66-20041 17-01

Descriptors: *Aircraft landing, *Ground effect, *Low aspect ratio wing, Aerodynamics, Analysis, Attitude, Delta, Elevator, Flare, Landing, Lift, Maneuver, Model, Moment, Pitch, Tunnel, Wind, Wing.

For abstract, see STAR 04 23.

N66-38425 **Field 1B**
CFSTI Prices HC$2.50 MF$0.50
Arizona Univ., Tucson.
MINIMUM TIME AIRCRAFT TRAJECTORIES BETWEEN TWO POINTS IN RANGE ALTITUDE SPACE.
by R. G. Brusch, and T. L. Vincent. Oct 66, 54p NASA-CR-631
Grant NSG-580

Descriptors: *Fixed point, *Trajectory analysis, *Variational calculus, Altitude, Continuous, Drag, Equation, Lift, Minimum, Motion, Range, Solution, Space, Thrust, Time, Velocity.

For abstract, see STAR 04 23.

N66-38805 **Field 1B**
CFSTI Prices HC$2.50 MF$0.75
Boeing Co., Seattle, Wash.
INFLIGHT AND GROUND-BASED SIMULATION OF HANDLING QUALITIES OF VERY LARGE AIRPLANES IN LANDING APPROACH.
by P. M. Condit, L. G. Kimbrel, and R. G. Root. Oct 66, 60p NASA-CR-635
Contract NAS2-3224

Descriptors: *Boeing 707 aircraft, *Flight simulation, *Handling quality, *Kc-135 aircraft, Aircraft, Approach and landing, Base, Flight, Ground, Pilot, Prototype, Roll, Stability, Stol aircraft, Testing, Transport, Variable.

For abstract, see STAR 04 23.

AD-101 000 **See Field 17G**

AD-102 897 **See Field 17G**

AD-227 738 **See Field 15G**

AD-238 041 **See Field 17G**

AD-641 479 **See Field 1D**

1C. AIRCRAFT

AD-241 637 **Field 1C, 15E**
CFSTI Price: HC$4.60
RAND Corp., Santa Monica, Calif.
AIRCRAFT COMPARTMENT DESIGN CRITERIA FOR THE ARMY DEPLOYMENT MISSION,
by W. F. Sharpe. 1 May 60, 45p Research memo. RM-2566
Contract AF 49 (638)-700

Descriptors: (*Air transportation, *Cargo), (*Logistics, *Transport planes), Design, Loading, Milk, Statistical analysis.

Identifiers: C-124 aircraft, C-130 aircraft, C-133 aircraft.

The memorandum is concerned with the design of cargo aircraft, particularly for their use in the army deployment mission. It suggests desirable relationships between compartment size and payload capacity for this mission, and thus aids in the design of future aircraft. The same criteria can also be used to assess capabilities of present aircraft. As a basis for comparing the carrying capacity and efficiency of various aircraft, the study employs a list of equipment drawn up by the Office of the Deputy Chief of Staff for Logistics of the U. S. Army. This list, received in September 1959, is an estimate of the equipment required by a hypothetical planning force designated as the 'A' Airborne Division Force, thought of as being used for show-of-force deployments. Final design decisions, must, of course, take other possible missions and lists of equipment into account. The following are some of the study's principal conclusions: (1) While cargo-compartment cubage may be an acceptable measure for measuring compartment space requirements for calculating peacetime airlift capability, the requirements of army deployment cargo demand a more accurate one. The bulk of this cargo is vehicular; peacetime cargo principally consists of small units which lend themselves to flexible arrangement. (2) The best single measure of the space requirement for the equipment studied (which excludes the largest items required in an army deployment) is cargo-compartment floor area rather than cubage.

AD-641 610 **Field 1C**
CFSTI Prices: HC$5.00 MF$1.00
Bell Aerosystems Co., Buffalo, N. Y.
A GENERALIZED EXPERIMENTAL STUDY OF INLET TEMPERATURE RISE OF JET V/STOL AIRCRAFT IN GROUND EFFECT,
by Robert F. Speth, and P. E. Ryan. 5 Apr 66, 159p Rept. no. 2099-928003
Contract N600 (19)63320

Descriptors: (*Jet planes, Vertical take-off planes), (*Jet engine inlets, Temperature), Air, Ground effect, Exhaust gases, Gas flow, Configuration, Airframes, Model tests.

Reduction in exhaust pressure ratio (weight flow) had very little effect on the inlet temperature rise. Reduction in exhaust gas temperature lowered the inlet air temperature significantly. Large changes in wing area and variations in lift engine inlet/exhaust arrangements caused no consistent or significant trends in inlet temperature rise characteristics. In dual lift engine configurations the forward inlet experiences somewhat higher temperatures than the aft inlet. Changes in wing planform shape and height on the fuselage had no appreciable influence on lift engine inlet temperature rise. Forward facing side inlets experience large rises in air temperature for any exhaust nozzle arrange-

ment. Typical aircraft components such as flaps, slats, inlet/exhaust doors, and landing gear have very little influence on inlet temperature rise. Deflecting the exhaust gases rearward, as in the case of STOL operation, reduced inlet temperature rise significantly at relatively low forward speeds. Moderate headwinds cause a rapid increase in inlet air temperature up to 15 to 20 fps after which the temperatures reduce somewhat. The magnitude of temperature rise is dependent on the inlet/exhaust arrangement. The motion during vertical ascent and descent apparently alters the pattern of hot gas recirculation and reduces the net inlet temperature rise considerably.

AD-641 677 **Field 1C**
CFSTI Prices: HC$4.00 MF$0.75
Technology, Inc., Dayton, Ohio.
A STRUCTURAL FLIGHT LOADS RECORDING PROGRAM ON CIVIL TRANSPORT HELICOPTERS.
Technical rept.,
by Cyril G. Peckham, F. Joseph Giessler, and Joseph F. Braun. Jul 66, 106p
Contract FA-WA-4590
Proj. FA-314-1R
FAA-ADS-79

Descriptors: (*Helicopters, Loading (Mechanics)), Flight, Transport planes, Civil aviation, Recording systems, Operation, Tables.

A flight loads program on a transport helicopter was conducted using a Boeing-Vertol 107-II helicopter operated by New York Airways. The following parameters were measured: airspeed, altitude, vertical load factor, pitch rate, rotor rpm, and two engine torques. Calculations based on the measured parameters included the running gross weight and rate of climb. The data were grouped into mission segments of takeoff and ascent, cruise, descent, flare and landing, and hover. After the best method of data presentation was determined, the data were sorted by parameter ranges. The primary presentation is in the form of bivariate and trivariate tables showing the time spent in each data range. Some of the more significant data effects are presented as histograms. The vertical load factor and pitch rate data are presented as exceedance and probability curves. (Author)

N66-32941 **Field 1C**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
FLIGHT INVESTIGATION OF DYNAMIC STABILITY AND CONTROL CHARACTERISTICS OF A 0.18-SCALE MODEL OF A FAN-IN-WING VTOL AIRPLANE.
by J. R. Chambers, and R. H. Kirby. Aug 66, 34p NASA-TN-D-3412

Descriptors: *Fan-in-wing aircraft, *Flight test, *Stability and control, *Vtol aircraft, Aircraft, Characteristic, Control, Dynamic, Fan, Flight, Model, Stability, Test, Vtol, Wing.

For abstract, see STAR 04 19.

N66-33020 **Field 1c**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
LOW-SPEED WIND-TUNNEL STUDIES RELATING TO PITCH-UP ON A SUPERSONIC TRANSPORT MODEL WITH A HIGH-ASPECT-RATIO VARIABLE-SWEEP WING.
by V. E. Lockwood. Aug 66, 75p NASA-TN-D-3542

Descriptors: *Aspect ratio, *Pitch control, *Supersonic transport, *Swept wing, *Wind tunnel model, Aspect, Control, Low speed, Method, Model, Pitch, Ratio, Reduction, Supersonic, Sweep, Testing, Transport, Tunnel, Wind, Wing.

For abstract, see STAR 04 19.

N66-34080 **Field 1C**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
SOME CONSIDERATIONS REGARDING THE APPLICATION OF THE SUPERSONIC AREA RULE TO THE DESIGN OF AIRPLANE FUSELAGES.
by R. T. Whitcomb. 3 Jul 56, 27p NACA-RM-L56E23A

Descriptors: *Aircraft design, *Fuselage, *Supersonic aircraft, *Wave drag, Aircraft, Area, Body, Combination, Design, Drag, Rule, Speed, Supersonic, Surface, Tail, Wave, Wing.

For abstract, see STAR 04 19.

N66-38360 **Field 1C**
CFSTI Prices HC$3.25 MF$1.25
National Aeronautics And Space Administration, Washington, D. C.
BREQUET 941 - IDENTIFICATION, PERFORMANCE, FLIGHT QUALITIES.
Sep 66, 185p NASA-TT-F-8842
Transl. Into English Of The Publ. "avion Breguet 941- Identification, Performances, Qualities En Vol, Rapport No. 1" Paris, Min. Des Armees, 1963

Descriptors: *Aircraft performance, *Breguet 941 aircraft, *Flight test, *Flying quality, *Stol aircraft, Aircraft, Cruise, Landing, Performance, Takeoff, Taxiing, Transport.

For abstract, see STAR 04 23.

N66-38415 **Field 1C**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
SONIC-BOOM MEASUREMENTS DURING BOMBER TRAINING OPERATIONS IN THE CHICAGO AREA.
by D. A. Hilton, V. Huckel, and D. J. Maglieri. Oct 66, 28p NASA-TN-D-3655

Descriptors: *Pressure measurement, *Signature, *Sonic boom, Amplitude, Atmosphere, Fighter, Instrumentation, Operation, Shape, Statistical, Training, Variation, Wave.

For abstract, see STAR 04 23.

AD-275 107 **See Field 1A**

AD-471 437 **See Field 13I**

AD-641 371 **See Field 1A**

AD-641 434 **See Field 20D**

AD-641 448 **See Field 15C**

AD-641 455 **See Field 15C**

PB-173 480 **See Field 14B**

1D. AIRCRAFT FLIGHT CONTROL AND INSTRUMENTATION

AD-449 419 **Field 1D, 14D**
CFSTI Price: HC$23.50
Battelle Memorial Inst., Columbus, Ohio.
RESEARCH AND STUDY OF ANALYTICAL TECHNIQUES FOR PREDICTING RELIABILITY OF FLIGHT-CONTROL SYSTEMS,
by R. E. Mesloh, R. K. Mitchell, D. G. Mark, G. E. Manning, and J. R. Goldgraben. Aug 64, 239p
Contract AF 33 (657)7978
Proj. AF-8225
Task 822502
FDL-TDR-64-50

Descriptors: (*Flight control systems, Mathematical models), Mathematical prediction, Performance (Engineering), Reliability, Analog computers, Simulation, Servomechanisms, Hydraulic actuators.

The objective of this program was to develop analytical techniques for predicting the performance variability of flight-control components with respect to time, whereby an inference of their drift reliability can be made without resorting to life testing of the components themselves. The techniques of analytical reliability prediction being developed at Battelle use a model that relates performance aspects of a device to its input and internal parameters. By manipulation of this model, partial derivatives of each performance characteristic with respect to internal parameters are derived. A propagation of variance formula, which utilizes the partial derivatives and values of parameter variance, is used to compute the variance of each aspect of device performance. A reliability estimate can then be derived by comparing the expected range of variability for the time in question with appropriate specification limits. A definite procedure for applying the moment method to a servo valve and hydraulic actuator is illustrated, with emphasis given to modeling this combination and to deriving the necessary data (performance partial derivatives and parameter variance) for utilization in the Propagation of Variance formula. A generalization of this analysis is presented which shows promise for application to other multiparameter precision devices. (Author)

AD-641 479 **Field 1D, 1B**
CFSTI Prices: HC$1.00 MF$0.50
Office of Aviation Medicine, Federal Aviation Agency, Washington, D. C.
IN-FLIGHT RESPONSE TO A NEW NON-GYROSCOPIC BLIND FLIGHT INSTRUMENT,
by Stanley R. Mohler, and A. Howard Hasbrook. 1963, 10p
AM-66-32
Prepared for presentation at the meeting of the Aerospace Medical Association, New York, N. Y. Apr 26-29, 1965.

Descriptors: (*Flight instruments, *Aviation safety), (*Instrument flight, Reaction (Psychology)), Pilots, Attitudes, Flight testing.

A new device which is small, completely self-contained, and which is not susceptible to tumbling, is evaluated. The results indicate that it will enable controlled flight under complete loss of outside visual reference (IFR) conditions. Since no electrical, vacuum or mechanical activation sources are required, the Kenyon instrument can be used in any aircraft (piston, turbine or glider) as an emergency blind flight instrument. (Author)

N66-33311 **Field 1D**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
AERODYNAMIC PERFORMANCE AND STATIC STABILITY AND CONTROL OF FLAT-TOP HYPERSONIC GLIDERS AT MACH NUMBERS FROM 0.6 TO 18.
by H. R. Gloria, M. F. Sarabia, and C. A. Syvertson. 17 Sep 58, 65p NACA-RM-A58617

Descriptors: *Hypersonic glider, *Performance characteristics, *Static stability and control, Aerodynamic, Arrow, Characteristics, Control, Glider, Helium, Hypersonic, Medium, Performance, Planform, Speed, Stability, Static, Supersonic, Wing.

For abstract, see STAR 04 19.

N66-33315 **Field 1D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECTS OF BOUNDARY-LAYER SUCTION AND SPOILERS ON TRANSONIC FLUTTER

DERIVATIVES FOR A MIDSPAN CONTROL SURFACE ON AN UPSWEPT WING.
by R. E. Dannenberg, B. J. Gambucci, R. M. Sorenson, and J. A. Wyss. Feb 60, 29p NASA-TM-X-160

Descriptors: *Boundary layer, *Control surface, *Spoiler, *Suction, *Transonic flutter, *Unswept wing, Aircraft, Boundary, Control, Design, Edge, Flutter, Layer, Midspan, Speed, Stability, Subsonic, Surface, Trailing, Transonic, Tunnel, Unswept, Wind, Wing.

For abstract, see STAR 04 19.

N66-33317 **Field 1D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
STATIC STABILITY AND CONTROL CHARACTERISTICS OF TWO LARGE-DIHEDRAL RIGHT TRIANGULAR PYRAMID LIFTING REENTRY CONFIGURATIONS AT A MACH NUMBER OF 3.05.
by W. E. Foss Jr. and C. F. Whitcomb. Jul 60, 29p NASA-TM-X-295

Descriptors: *Lifting reentry, *Reentry vehicle, *Static stability and control, Control, Dihedral, Dihedral effect, Effect, Lifting, Longitudinal, Manned, Pyramid, Reentry, Stability, Static, Vehicle.

For abstract, see STAR 04 19.

N66-33318 **Field 1D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
TRANSONIC STATIC AND DYNAMIC LONGITUDINAL STABILITY CHARACTERISTICS OF A LOW-FINENESS- RATIO, BLUNTED-CYLINDER REENTRY BODY HAVING A CONVERGING-CONE AFTERBODY.
by E. R. Hillje, and A. O. Pearson. May 62, 28p NASA-TM-X-672

Descriptors: *Blunt body, *Cylinder, *Dynamic stability, *Longitudinal stability, *Low fineness ratio, *Reentry body, *Static stability, Afterbody, Blunt, Body, Cone, Convergence, Dynamic, Longitudinal, Pressure, Reentry, Stability, Static, Transonic, Tunnel.

For abstract, see STAR 04 19.

N66-33319 **Field 1D**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
STABILITY AND CONTROL CHARACTERISTICS AT LOW SUBSONIC SPEEDS OF AN AIRPLANE CONFIGURATION HAVING TWO TYPES OF VARIABLE-SWEEP WINGS.
by B. Spencer Jr. Aug 60, 99p NASA-TM-X-303

Descriptors: *Static stability and control, *Subsonic speed, *Supersonic aircraft, *Swept wing, *Variable sweep, Aircraft, Angle, Control, Speed, Stability, Static, Subsonic, Supersonic, Sweep, Sweepback, Variable, Wing.

For abstract, see STAR 04 19.

N66-33320 **Field 1D**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
STATIC LONGITUDINAL, DIRECTIONAL, AND LATERAL STABILITY AND CONTROL DATA AT A MACH NUMBER OF 6.83 OF THE FINAL CONFIGURATION OF THE X- 15 RESEARCH AIRPLANE.
by D. E. Fetterman Jr. and J. A. Penland. Apr 60, 82p NASA-TM-X-236

Descriptors: *Directional stability, *Hypersonic speed, *Lateral stability and control, *Longitudinal stability and control, *Static stability and control, *X- 15 aircraft, Aircraft, Control, Direction, Hypersonic, Lateral, Longitudinal, Research, Speed, Stability, Static.

For abstract, see STAR 04 19.

N66-34082 **Field 1D**
CFSTI Prices HC$3.00 MF$1.00
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
TRANSONIC WIND-TUNNEL INVESTIGATION OF STATIC LONGITUDINAL AND LATERAL STABILITY AND CONTROL CHARACTERISTICS AND DRAG RISE OF A REPRESENTATIVE FIGHTER AIRPLANE.
by P. K. Pierpont. Mar 59, 140p NASA-MEMO-12-14-58L

Descriptors: *Drag, *Fighter aircraft, *Lateral stability and control, *Longitudinal stability and control, *Static stability and control, *Transonic wind tunnel, Aircraft, Control, Fighter, Lateral, Longitudinal, Stability, Static, Transonic, Tunnel, Wind.

For abstract, see STAR 04 19.

N66-34083 **Field 1D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL INVESTIGATION OF A BODY FLARE FOR OBTAINING PITCH STABILITY AND A BODY FLAP FOR OBTAINING PITCH CONTROL IN HYPERSONIC FLIGHT.
by A. J. Eggers Jr. and C. A. Syvertson. 18 Jan 55, 41p NACA-RM-A54J13

Descriptors: *Aircraft configuration, *Hypersonic flight, *Pitch control, Aircraft, Body, Configuration, Control, Design, Drag, Flap, Flare, Flight, Hypersonic, Lift, Longitudinal, Missile, Pitch, Stability, Tail.

For abstract, see STAR 04 19.

N66-34084 **Field 1D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
EXPERIMENTALLY DETERMINED EFFECTS OF VARYING PITCH AND CONTROL STIFFNESSES ON THE FLUTTER CHARACTERISTICS AT SUPERSONIC SPEEDS OF ALL- MOVABLE WING AND TAIL MODELS.
by P. W. Hanson. Mar 59, 50p NASA-MEMO-10-16-58L

Descriptors: *Fighter aircraft, *Flutter, *Horizontal tail, *Supersonic speed, *Vertical tail, Aircraft, Control, Fighter, Horizontal, Model, Pitch, Scale, Stiffness, Tail, Variable, Vertical, Wing.

For abstract, see STAR 04 19.

AD-463 062 **See Field 17B**

AD-481 367 **See Field 17B**

2C. AGRICULTURAL ENGINEERING

AD-260 695 **Field 2C, 4B**
CFSTI Price: HC$17.10
California Univ., Davis.
INVESTIGATION OF ENERGY AND MASS TRANSFERS NEAR THE GROUND INCLUDING THE INFLUENCES OF THE SOIL-PLANT-ATMOSPHERE SYSTEM,
by F. A. Brooks, and W. O. Pruitt. Feb 61, 176p Contract DA-36-039-SC -80334

Descriptors: (*Atmosphere, *Biophysics), (*Micrometeorology, *Plants (Botany)), (*Soils, Data processing systems), Ecology, Energy, Evapotranspiration, Heat transfer, Mass-energy relation, Measurement, Theory.

Effort was primarily directed toward gaining capability and facility in measuring, recording, and handling large amounts of data. Some measurements of evapotranspiration and radiation were made in anticipation of the full-scale program. Studies of the soil-plant-atmosphere system influences on the transfer of energy and mass were conducted and will be continued. The research group has acquired instrumentation capable of handling 300 measurements in two minutes and placing the analog values on punched cards in a form suitable for computer handling. The evapotranspiration-radiation data indicate soil-plant-atmosphere system studies are: (1) the path of water flow in plant roots is localized primarily in young roots with little movement occurring through older tissues, and (2) automatic diurnal fluctuations in transpiration occur in plants growing under continuous light and controlled temperature and humidity. The results show that the data nal cycling effect, with higher evapotranspiration rates in fall than in spring under similar radiation conditions. Two findings from the soil-plant-atmosphere system studies are: (1) the path of water flow in plant roots is localized primarily in young roots with little movement occurring through older tissues, and (2) automatic diurnal fluctuations in transpiration occur in plants growing under continuous light and controlled temperature and humidity. The results show that the data nal cycling effect, with higher evapotranspiration rates in fall than in spring under similar radiation conditions.

2E. ANIMAL HUSBANDRY

AD-641 416 **See Field 6C**

2F. FORESTRY

PB-173 469 **See Field 11L**

3A. ASTRONOMY

AD-641 443 **Field 3A**
Not available from CFSTI.
California Univ., Los Angeles.
PHOTOELECTRIC SPECTROPHOTOMETRY OF ETA CARINAE.
Astronomical papers, vol 5 no. 12,
by L. H. Aller. 7 Feb 66, 9p
Grant AF-AFOSR-83-63
Proj. AF-9774
Task 977401
AFOSR-66-1688
Availability: Published in Proceedings of the National Academy of Sciences v55 n4 p671-6 Apr 1966.

Descriptors: (*Variable stars, Spectroscopy), Continuous spectrum, Line spectrum, Energy, Intensity.

Identifiers: Eta carinae.

Spectroscopic observations were made of eta carinae to provide quantitative line intensity data. The observations were made with the 26 inch telescope at Mount Bingar and the 50 inch telescope at Mount Stromlo. Tracings of the spectrum were obtained using the Michigan photoelectric scanner. The research has provided measurements of (1) the energy distribution in the continuum, (2) the relative intensities of the emission lines and (3) the absolute fluxes in terms of ergs/sq cm/sec reaching the top of the earth's atmosphere by calibrating one or more of the stronger lines. (Author)

AD-641 447 **Field 3A**
Not available from CFSTI.
California Univ., Los Angeles. Dept. of Astronomy.

SPECTROPHOTOMETRIC STUDIES OF GASEOUS NEBULAE. V. MEASUREMENT OF LINE INTENSITIES IN PLANETARY NEBULAE WITH AN ELECTRONIC CAMERA.
Astronomical papers vol. 4 no. 9,
by L. H. Aller, and M. F. Walker. 11 Jan 65, 17p
Grants AF-AFOSR-83-63, NsG-267
Proj. AF-9774
Task 977401
AFOSR-66-1583
Availability: Published in Astrophysical Journal v141 p1318-30 May 15 1965.

Descriptors: (*Nebulae, Line spectrum), Intensity, Measurement, Spectrographic cameras.

The spectra of several planetary nebulae, IC 351, NGC 1535, NGC 2022, NGC 6309, NGC 6720, NGC 6741, and Anon 21 (h)29 (m)=VV 267 have been observed with a Lallemand electronic camera at the coude focus of the 120-inch reflector in the spectral region between lambda 3600 and lambda 4400. It is concluded that an image converter can yield as reliable line intensities as can conventional photographic methods. The large scale at the coude focus enables the observer to measure relative intensities at several points in the nebular image, while the relatively high dispersion makes weaker lines detectable against the continuum of the central star or that of the nebula itself. Also the linear response of the image tube even for high electronographic plate densities makes possible (1) intensity measurements without the errors introduced by the usual photographic reduction process, and (2) considerably extends the range of intensity measurements that can be made as compared with conventional photographic photometry. (Author)

AD-641 650 **Field 3A, 14E**
CFSTI Prices: HC$3.00 MF$0.75
Foreign Technology Div., Wright-Patterson AFB, Ohio.
NEW TECHNIQUES IN ASTRONOMY: SELECTED ARTICLES.
13 Apr 66, 65p FTD-TT-66-38
TT-66-62565
Unedited rough draft trans. of mono. Novaya Tekhnika v Astronomii, n.p., 1963 p13-6, 60-79, 91-7, 111-7.

Descriptors: (*Astronomy, Instrumentation), Telescopes, Control systems, Azimuth, Photographic techniques, Stars, Images, Astronomical cameras, Satellites (Artificial), USSR.

Contents: Control system for the 2.6-meter telescope: Certain principals of construction of discreet systems of control for azimuthal astronomical instruments; Photographic method for studying the erratic nature of stellar images; Camera with optical compensator for observing artificial earth satellites.

N66-33167 **Field 3A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
INSTRUMENTATION FOR INVESTIGATING THE PHYSICAL PROPERTIES OF THE LUNAR SURFACE.
by A. G. Beswick. 1964, 21p NASA-TM-X-54872
Presented At The 19th Ann. Isa Conf. And Exhibit, N. Y., 12-15 Oct. 1964

Descriptors: *Accelerometer, *Lunar surface, *Penetrometer, *Physical property, Bearing, Hardness, Impact, Instrumentation, Lunar, Penetration, Physical, Property, Strength, Surface, Telemetry.

For abstract, see STAR 04 19.

N66-33368 **Field 3A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EFFECT OF NON-SYNCHRONOUS ROTATION ON CLOSE BINARY STARS.
by S.-S. Huang. 2 Dec 64, 10p NASA-TM-X-54937
Submitted For Publication

Descriptors: *Astronomical model, *Binary star, *Celestial mechanics, *Stellar rotation, Analysis, Astronomy, Binary, Celestial, Close, Limitation, Mechanics, Model, Nonsynchronization, Rotation, Star, Stellar, Surface.

For abstract, see STAR 04 19.

N66-33371 **Field 3A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE GENERAL PERTURBATIONS OF THE POSITION VECTORS OF A PLANETARY SYSTEM.
by P. Musen. 1963, 31p NASA-TM-X-54853
Submitted For Publication

Descriptors: *Perturbation theory, *Planetary configuration, *Series expansion, Algebra, Astronomy, Configuration, Expansion, Function, Perturbation, Planetary, Position, Series, Sphere, System, Theory.

For abstract, see STAR 04 19.

N66-33394 **Field 3A**
CFSTI Prices HC$3.00 MF$0.75
Harvard Coll. Observatory, Cambridge, Mass.
DATA PROCESSING OF LUNAR INFRARED MEASUREMENTS AT HIGH SPATIAL AND RADIOMETRIC RESOLUTION TO OBTAIN BRIGHTNESS TEMPERATURES SCIENTIFIC REPORT NO. 9.
by H. Boeschenstein Jr, Y. C. Hu, H. C. Ingrao, E. G. Levin, and M. F. Leyland. 1 Jun 66, 101p NASA-CR-77004
Grant NSG-64-60

Descriptors: *Data processing, *Infrared radiation, *Lunar temperature, *Radiometry, Atmospheric, Attenuation, Brightness, Data, Infrared, Lunar, Measurement, Processing, Radiation, Resolution, Spatial, Temperature.

For abstract, see STAR 04 19.

N66-33399 **Field 3A**
CFSTI Prices HC$4.00 MF$1.00
Control Data Corp., Minneapolis, Minn. Minnesota Univ., Minneapolis.
DESIGN OF AN AUTOMATED STELLAR PROPER MOTION MEASURING SYSTEM, 1 JULY 1965 - 30 JUNE 1966.
by A. E. La bonte, J. S. Newcomb, and G. E. Zenk. 1966, 126p NASA-CR-77063
Contract NSR-24-005-062
Prepared For Minnesota Univ.

Descriptors: *Astronomy, *Scanning device, *Sky, *Stellar motion, Beam, Design, Device, Laser, Measuring, Motion, Pair, Plate, Prism, Proper, Record, Region, Scanning, Star, Stellar, Time.

For abstract, see STAR 04 19.

N66-33770 **Field 3A**
CFSTI Prices HC$2.50 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
PLANETARY SPECTRA BY FOURIER SPECTROSCOPY. I - MARS.
by J. Connes, and P. Connes. 1 Aug 66, 55p NASA-CR-77116, JPL-TR-32-998
Contract NAS7-100

Descriptors: *Interferometry, *Mars (planet), *Spectroscopy, Data, Interference, Observation, Planetary, Spectrometer, Spectrum, Table.

For abstract, see STAR 04 19.

3B. ASTROPHYSICS

AD-473 746 **Field 3B**
CFSTI Prices: HC$1.60 MF$0.50
Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex. Environmental Sciences Directorate.
ATMOSPHERIC SOUND PROPAGATION NEAR THE EARTH'S SURFACE,
by Ricardo Pena, and Marvin Diamond. Oct 65, 16p
Proj. DA-1P620901A198-02
ECOM-5018

Descriptors: (*Sound transmission, *Atmosphere), Measurement, Microphones, Barometric pressure, Errors, Atmospheric temperature, Earth, Surface temperatures, Meteorological parameters, Experimental data, Troposphere.

A study of sound propagation near the earth's surface under relatively calm meteorological conditions showed considerable variation in the pressure of detected waves. This variation was shown to be due to atmospheric effects between the source and detector. The accuracy of determining the elevation angle of the sound source was found to be highly dependent upon the surface temperature. (Author)

AD-482 811 **Field 3B, 17I**
CFSTI Prices: HC$2.00 MF$0.50
Indatacon Corp., Newton, Mass.
AN UNATTENDED METEOR TRAIL HIGH ALTITUDE WIND AND DENSITY MEASURING SET.
Final rept. 1 Jun 63-2 Nov 64,
by William H. Ramsey. 2 Nov 64, 39p
Contract AF 19 (628)-2996

Descriptors: (*Meteors, Radar tracking), Yagi antennas, Stratosphere, Measurement, Wind, High altitude, Velocity, Density, Mobile, High frequency, Upper atmosphere, Doppler radar, Low frequency, Coherent radar, Design.

A coherent radar system was developed which successfully detected the presence of ionized meteor trails in the atmosphere at altitudes of 80 to 104 kilometers at each of the two design frequencies. Doppler shift, elevation angle, slant range, and decay data were successfully determined and recorded on film.

AD-641 444 **Field 3B**
Not available from CFSTI.
Hebrew Univ., Jerusalem (Israel). Lab. of X-Rays and Far Ultraviolet Spectroscopy.
IDENTIFICATIONS OF SOLAR ULTRAVIOLET LINES RESULTING FROM A STUDY OF THE Ar I AND K I ISOELECTRONIC SEQUENCES.
Interim rept.,
by U. Feldman, B. S. Fraenkel, and S. Hoory. 1 Apr 65, 7p
Grant AF-AFOSR-62-63
Proj. AF-9763
Task 976302
AFOSR-66-1738
Revision of manuscript submitted 18 Feb 65.
Availability: Published in The Astrophysical Journal v142 n2 p719-23 Aug 15 1965.

Descriptors: (*Solar radiation, Spectra (Visible + ultraviolet)), Line spectrum, Classification, Atomic energy levels, Electron transitions.

The classification of the 3p (5)3d level in ArI isoelectronic spectra and the interaction between configurations 3p (6)3d (r-n1) and 3p (5)3d (r ;1) are discussed. Solar lines of transitions 3p (6)-3p (5)n1, 3p (6)3d-3p (6)n1 and 3p (6)3d-3p (5)3d (2) are identified. (Author)

AD-641 509 **Field 3B, 20H**
CFSTI Prices: HC$6.00 MF$1.50
Space Technology Labs., Redondo Beach, Calif.
A COMPREHENSIVE MAP OF THE SPACE RADIATION ENVIRONMENT,
by A. Rosen, C. A. Eberhard, T. A. Farley, and J. L. Vogl.1966, 272p Rept. no. 8644-6002-RU-000
Contract AF 41 (609)-1456

Descriptors: (*Space environmental conditions, *Maps), (*Handbooks, Astronautics), Electrons, Protons, Solar flares, Aurorae, Cosmic rays.

The handbook consists of two divisions; a Space Radiation Map and a Background Information Section. The term Space Radiation, as used in the handbook, includes high energy particulate radiation: (a) Electrons of energy greater than 10 kev (E>10 kev); (b) Protons: E>50 kev; and (c) Other charged and uncharged particles with atomic numbers Z>1: E>50 kev; and high energy electromagnetic radiation (photons): E>10 kev. (Author)

AD-641 543 **Field 3B**
Not available from CFSTI.
Rice Univ., Houston, Tex. Dept. of Space Science.
DETECTABILITY OF LUNAR X-RAYS,
by R. C. Haymes, and R. D. Juday. 16 Jul 65, 7p
Grant AF-AFOSR-858-65
Proj. AF-9751
Task 975102
AFOSR-66-0796
Availability: Published in Planet Space Sci. v13 p1249-54 1965.

Descriptors: (*Moon, *X RAYS), Upper atmosphere, X-RAY SPECTRUM, Aurorae.

Several theories that imply the generation of X-rays by the moon were examined. The X-ray fluxes to be expected at the top of the Earth's atmosphere were estimated and compared. For example, it was found that an X-ray flux is to be expected when the Moon is full and k sub p high, as a consequence of the configuration of the auroral electrons in space deduced from the long tail model of the magnetosphere. The X-ray photons are caused by energetic electrons in the tail that bombard the lunar surface. Alternatively, Gold has suggested that lunar X-rays are produced by the bombardment by solar-wind electrons; this results in a lunar phase dependence that is different from the long tail model. The background is discussed and it is concluded that the lunar X-ray flux may be detectable. Experiments of this kind may provide useful tools for investigating the models. (Author)

AD-641 608 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill.
THE PHYSICAL CHARACTERISTICS AND DISTRIBUTION IN SPACE OF GALAXIES: THE CHARACTERISTICS OF THE SUPERGIANT 'D GALAXIES'.
Final rept.,
by W. W. Morgan. Sep 66, 4p
Contract Nonr-1891 (00)
Proj. NR-046-759

Descriptors: (*Galaxies, Extraterrestrial radio waves), (*Astrophysics, Galaxies), Spectroscopy.

The report summarizes the work carried out under the contract, (NONR-1891 (00)), which has been going on for approximately ten years under successive renewals.

AD-641 687 **Field 3B, 20H**
Not available from CFSTI.
Rochester Univ., N. Y. Dept. of Physics and Astronomy.
A HEURISTIC MODEL FOR THE VARIATION WITH RIGIDITY OF THE COSMIC-RAY CHARGE SPECTRUM,
by M. F. Kaplon, and G. Skadron. 17 Jun 64, 26p
Grant AF-AFOSR-439-63, NSF-GP-1372
Proj. AF-9774
Task 977402
AFOSR-66-0798
Availability: Published in Il Nuovo Cimento v34 Ser 10 p1687-1711 Dec 16 1964.

Descriptors: (*Supernovae, Cosmic rays), (*Cosmic rays, Nuclear spectroscopy), Charged particles, Magnetic fields, Galaxies, Nuclei, Reflection, Theory.

An idealized model based on the supernova origin of cosmic radiation is proposed to account for the variation with rigidity of the cosmic-ray charge spectrum. It is assumed that a supernova explosion results in the injection of a pure power-law spectrum and a composition relatively rich in heavy nuclei. Particles are confined within a volume local to the source region by a magnetic boundary resulting in a rigidity-dependent coefficient of reflectivity; this yields a source-region path length varying inversely with rigidity. As a result, the differential spectra of particles escaping from the boundary into the galaxy are determined by the reflectivity; and as a result of the nuclear interactions in the source region, the composition varies with rigidity. The additional effect of intragalactic motion is taken into account and the differential rigidity spectra, as a function of composition at the earth, are calculated. Predictions for the H/M, L/M and He/H ratios as a function of rigidity as well as the differential rigidity spectra are compared with experiment and are not in disagreement with the available data. The limitations and plausibility of the model are summarized and discussed. (Author)

AD-641 972 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
MOVIE OF THE INTERPLANETARY MAGNETIC FIELD.
Technical rept.,
by John M. Wilcox, Arthur Douglas Ritchie, and Norman F. Ness. 14 Oct 66, 14p Series-7-Issue-53
Contract Nonr-3656 (26), Grant NsG-243-62
Proj. NR-021-101

Descriptors: (*Solar systems, *Magnetic fields), Motion pictures, Magnetometers, Upper atmosphere, Terrestrial magnetism, Scientific satellites.

The note describes a 16 mm movie representing a portion of the IMP-1 magnetometer observations of the interplanetary magnetic field.

N66-32956 **Field 3B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LUNAR STRUCTURES AS DEDUCED FROM MUONG NONG TEKTITES.
by I. Adler, and J. A. Okeefe. Aug 66, 16p
NASA-TN-D-3564

Descriptors: *Lunar surface, *Moon, *Tektite, Ash, Coesite, Flow, Glass, Lightning, Lunar, Origin, Structure, Surface, Topography, Void.

For abstract, see STAR 04 19.

N66-33100 **Field 3B**
CFSTI Prices HC$1.00 MF$0.50
Royal Greenwich Observatory, Herstmonceux (England).
FUNDAMENTAL DATA FOR SOUTHERN STARS (SIXTH LISTS).
by D. S. Evans. 1966, 23p
Its Bull. No. 110

Descriptors: *Photometry, *Spectral analysis, *Star, *Velocity, Analysis, Color, Data, Determination, Magnitude, Parallax, Radial, South, Spectral, Spectroscopy, Sun.

For abstract, see STAR 04 19.

N66-33118 **Field 3B, 4A**
CFSTI Prices HC$4.00 MF$1.00
Kakioka Magnetic Observatory (Japan).
GEOMAGNETIC AND GEOELECTRIC OBSERVATIONS, 1964 (RAPID VARIATIONS).
1966, 116p REPT.-5

Descriptors: *Magnetic storm, *Solar flare, *Sudden ionospheric disturbance (sid), *Table, Bay, Disturbance, Effect, Flare, Geomagnetism, Impulse, Induction, Ionospheric, Magnetic, Magnetogram, Pulse, Solar, Storm, Sudden, Tellurometer.

For abstract, see STAR 04 19.

N66-33137 **Field 3B**
CFSTI Prices HC$1.00 MF$0.50
Royal Greenwich Observatory, Herstmonceux (England).
PHOTOELECTRIC PHOTOMETRY OF RR LYRAE STARS.
by D. H. Jones. 1966, 21p
Its Bull. No. 112

Descriptors: *Light intensity, *Photoelectric photometry, *Star, Color, Curve, Intensity, Light, Lyrae constellation, Magnitude, Photoelectric, Photometry, Stellar, Table.

For abstract, see STAR 04 19.

N66-33169 **Field 3B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LUNAR DIFFERENTIATION PROCESSES.
by L. S. Walter. 1964, 21p NASA-TM-X-54903
Submitted For Publication

Descriptors: *Lunar surface, *Magma, *Petrology, *Selenology, Activity, Chemical, Composition, Crust, Deficiency, Differentiation, Generation, Gradient, Igneous, Lunar, Moon, Oxygen, Pressure, Process, Rock, Surface, Volcanic, Water.

For abstract, see STAR 04 19.

N66-33182 **Field 3B**
CFSTI Prices HC$4.00 MF$0.75
National Aeronautics And Space Administration. Goddard Inst. For Space Studies, New York.
A REVIEW OF NUCLEAR ENERGY GENERATION IN STARS, AND SOME ASPECTS OF NUCLEOSYNTHESIS.
by H. Reeves. Sep 64, 105p NASA-TM-X-54921
Submitted For Publication

Descriptors: *Nuclear energy, *Nucleosynthesis, *Stellar evolution, Chemical, Composition, Energy, Error, Evolution, Generation, Nuclear, Reaction, Star, Stellar.

For abstract, see STAR 04 19.

N66-33379 **Field 3B**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DYNAMICS AND EVOLUTION OF CLOSE BINARY SYSTEMS.
by S.-S. Huang. 1964, 100p NASA-TM-X-54930
Submitted For Publication

Descriptors: *Astronomy, *Binary star, *Celestial mechanics, *Stellar evolution, Bi-

nary, Celestial, Close, Dynamics, Evolution, Mechanics, Observation, Principle, Star, Stellar, System.

For abstract, see STAR 04 19.

N66-33414 **Field 3B**
CFSTI Prices HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
THE BLUE HAZE OF MARS.
by A. Palm. 7 Dec 64, 25p NASA-CR-59938
Grant NSG 243-62
Submitted For Publication Its Ser. No. 5, Issue No. 70

Descriptors: *Heliocentricity, *Mars atmosphere, *Meteor shower, Atmosphere, Blue, Clearing, Correlation, Dust, Function, Interplanetary, Intersection, Interval, Longitude, Mars, Meteor, Method, Optical, Orbit, Property, Shower.

For abstract, see STAR 04 19.

N66-33425 **Field 3B**
CFSTI Prices HC$4.00 MF$1.00
National Aeronautics And Space Administration. Goddard Inst. For Space Studies, New York.
STELLAR EVOLUTION - A SURVEY WITH ANALYTIC MODELS.
by R. Stein. 1964, 152p NASA-TM-X-54861
Submitted For Publication

Descriptors: *Astrophysics, *Galactic evolution, *Mathematical model, *Stellar structure, Analysis, Calculation, Discussion, Evolution, Galaxy, Mathematics, Model, Reproduction, Stellar, Structure.

For abstract, see STAR 04 19.

N66-33526 **Field 3B**
CFSTI Prices HC$4.00 MF$1.00
Israel Program For Scientific Translations, Ltd., Jerusalem.
PHYSICS OF THE MOON AND THE PLANETS.
by I. K. Koval. 1966, 116p NASA-TT-F-382, TT-66-51019
Transl. Into English Of "fizika Luny I Planet" Kiev, Naukova Dumka, 1964 Prepared For Nasa And Nsf

Descriptors: *Comet, *Lunar surface, *Mars atmosphere, *Optical property, *Planetary surface, *Polarimetry, *Spectrophotometry, Atmosphere, Brightness, Color, Contrast, Light, Lunar, Mars, Optical, Planetary, Property, Reflection, Scattering, Surface, Tail.

For abstract, see STAR 04 19.

N66-33978 **Field 3B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
RELATIONSHIP OF THE ALBEDO OF VENUS TO WAVELENGTH IN THE ULTRAVIOLET BAND OF THE SPECTRUM.
by I. N. Glushneva. Aug 66, 11p NASA-TT-F-8798
Transl. Into English From Astron. Inst. Of Sternberg (Ussr), No. 133, 1964 P 37-43

Descriptors: *Albedo, *Ultraviolet spectrum, *Venus, Astronomy, Atmosphere, Band, Reflection, Relation, Spectrography, Spectrum, Ultraviolet, Wavelength.

For abstract, see STAR 04 19.

N66-37812 **Field 3B**
CFSTI Prices HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
SOME COMMENTS ON THE "THE COMPOSITION OF THE MARTIAN SURFACE" BY R. A. VAN TASSEL AND J. W. SALISBURY.
by D. G. Rea. 1964, 8p NASA-CR-60258
Grant NSG-101-61

Descriptors: *Mars surface, *Silicate, *Surface layer, Abrasion, Composition, Concentration, Limonite, Mineral, Planetary, Resistance, Surface, Theory.

For abstract, see STAR 04 23.

N66-38141 **Field 3B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
ERROR ANALYSIS OF A WEIGHTED LEAST SQUARES PROCESS TO DETERMINE THE LUNAR GRAVITATIONAL FIELD.
by H. R. Compton, and R. H. Tolson. Oct 66, 39p NASA-TN-D-3662

Descriptors: *Error, *Gravitational field, *Least squares method, *Lunar gravitation, Analysis, Axis, Coefficient, Correlation, Eccentricity, Effect, Element, Function, Gravitational, Harmonics, Inclination, Matrix, Measurement, Mode, Orbital, Position, Potential, Range, Rate, Satellite, Spherical, Tesseral, Tracking, Zone.

For abstract, see STAR 04 23.

N66-38709 **Field 3B**
CFSTI Prices HC$2.00 MF$0.50
California Univ., Los Angeles. Dept. Of Astronomy.
STUDIES OF THE SOLAR SYSTEM AND PROBABLE LUNAR ABUNDANCES OF ELEMENTS OF GEOCHEMICAL AND METALLURGICAL SIGNIFICANCE STATUS REPORT.
by L. H. Aller. 30 Sep 66, 31p NASA-CR-78503
Contract NGR-05-007-046

Descriptors: *Element abundance, *Geochemistry, *Solar system, Abundance, Atmosphere, Element, Iron, Line, Metal, Metallurgy, Model, Rare, Solar, Spectrum, Sun, System, Titanium, Tracing, Transition.

For abstract, see STAR 04 23.

N66-38712 **Field 3B**
CFSTI Prices HC$4.00 MF$1.25
Arizona Univ., Tucson.
COMMUNICATIONS OF THE LUNAR AND PLANETARY LABORATORY, VOLUME 5, PART 1, NUMBER 70.
by D. W. Arthur, R. H. Pellicori, and C. A. Wood. 25 May 66, 216p NASA-CR-78466
Grant NSG-161

Descriptors: *Lunar crater, *Moon, Astronomy, Catalog, Crater, Diameter, Index, Limb, Location, Lunar, Map, Name, Peak, Photography, Position, Quadrant.

For abstract, see STAR 04 23.

N66-38803 **Field 3B**
CFSTI Prices HC$2.50 MF$0.75
Texaco Experiment, Inc., Richmond, Va.
AN EXPERIMENTAL STUDY OF FLUIDIZATION PROCESSES UNDER LUNAR CONDITIONS.
by I. R. King, and G. H. Miller. Oct 66, 102p NASA-CR-627
Contract NAS5-9231

Descriptors: *Fluidized bed, *Lunar mare, Ash, Density, Effect, Flow, Gas, Particle, Pressure, Shape, Simulation, Size, Soil, Solar, Talc, Vacuum, Vapor.

For abstract, see STAR 04 23.

PB-173 443 **Field 3B**
CFSTI Prices: HC$3.00 MF$0.75
Smithsonian Astrophysical Observatory, Cambridge, Mass.
RADAR DOPPLER SPECTROSCOPY OF MARS. I. ELEVATION DIFFERENCES BETWEEN BRIGHT AND DARK AREAS.
Special rept.,
by Carl Sagan, James B. Pollack, and Richard M. Goldstein. 6 Sep 66, 83p SR-221
Report on Research in Space Science.

Descriptors: (*Mars (Planet), Radio astronomy), (*Radar signals, Doppler effect), Radiofrequency spectroscopy, Optical properties, Extraterrestrial topography, Brightness, Radar reflections.

From the quasi-specular component of the radar power reflectivity as a function of Martian longitude, and from the radar Doppler spectra also as a function of longitude, the Martian dark areas were found to have systematically higher evaluation than the adjacent bright areas. Slopes of a few degrees are deduced, and elevation differences up to 17 km are inferred. These slopes and elevations are similar to those expected for the Earth if oceans and water erosion were removed and the acceleration due to gravity decreased by a factor 2.5. Steep slopes are found for the 'canals,' shallow slopes for Nix Olympia and areas noted for their secular changes, and the highest elevations are deduced for the most prominent dark areas. (Author)

PB-173 444 **Field 3B, 20H**
CFSTI Prices: HC$3.00 MF$0.75
Smithsonian Astrophysical Observatory, Cambridge, Mass.
THE PRODUCTION OF COSMIC GAMMA RAYS IN INTERSTELLAR AND INTERGALACTIC COSMIC-RAY COLLISIONS. I. THE KINEMATICS OF p-p INTERACTIONS AND SECONDARY MESON AND HYPERON DECAY AND THE COSMIC GAMMA-RAY SPECTRAL SOURCE FUNCTION.
Special rept.,
by F. William Stecker. 31 Aug 66, 72p SR-220
Report on Research in Space Science.

Descriptors: (*Gamma rays, Cosmic rays), (*Cosmic rays, *Nuclear reactions), (*Decay schemes, Cosmic rays), Mesons, Hyperons, Secondary emission, Proton reactions, Interstellar matter, Pions, K mesons, V particles, Sigma hyperons, Green's function, Gamma-ray spectra.

From the results of experimental particle physics and the relativistic kinematics of particle decay, expressions are derived for calculating the source functions for the production of gamma rays from the secondary mesons and hyperons produced in high-energy p-p interactions. Gamma rays are considered to be produced from the decays of secondary neutral pions, neutral and charged kaons, lambda particles, and neutral and charged sigma particles. The resultant source-function expressions are given in terms of production functions in the form of Green's functions for the secondary particles listed above. These production functions may then be obtained from proton accelerator data and cosmic-ray air shower data and, in conjunction with the expressions derived, can be used to compute the gamma-ray source functions and resultant cosmic gamma-ray spectrum generated by high-energy p-p interactions. (Author)

AD-641 339 **See Field 5A**

AD-641 350 **See Field 8N**

AD-641 795 **See Field 4A**

3C. CELESTIAL MECHANICS

AD-641 755 **Field 3C, 20J**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
THE CONFERENCE ON GRAVITY IN TIFLIS.

Technical translation,
by G. S. Bisnovatyi-Kogan. 1966, 9p ACIC-TC-1115
TT-66-62583
Gravitatsionnaya Conferentsiya v Tbilisi, trans. of Zemlya i Vselennaya (USSR), v1 n5 p71-3 1965.

Descriptors: (*Gravity, Symposia), USSR, Relativity theory, Celestial mechanics, Stars.

Papers presented at the Conference are reviewed.

4A. ATMOSPHERIC PHYSICS

AD-462 122 **Field 4A**
CFSTI Price: HC$5.60
Army Natick Labs., Mass.
THE YUMA TEST STATION, ARIZONA, HOURLY AND DAILY INSOLATION RECORD 1951 - 1962.
Technical rept.,
by Iven Bennett. Mar 65, 58p TR-ES-15
Proj. DA-1V025001A129

Descriptors: (*Solar radiation, Arizona), (*Arizona, Solar radiation), Instrumentatiog, Pyrheliometers, Cloud cover, Sun, Radiation measurement systems, Climatology, Deserts,

Atmospheric temperature.

Approximately 10 years of hourly and daily insolation data for the U. S. Army Yuma Test Station, Arizona, are summarized in tabular and graphical form. Frequency distributions, totals and means of hourly and daily insolation, are given for each month of the year. The data were collected by an eppley pyrheliometer (horizontal mount) and an electronic strip chart recorder. Integration and reduction of the data to numerical form were done visually. Information is presented concerning the efficiency of the eppley pyrheliometer, and of the adequacy of visual data integration and reduction. (Author)

AD-641 351 **Field 4A**
Not available from CFSTI.
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
DIFFUSION COEFFICIENTS IN THE UPPER ATMOSPHERE FROM CHEMILUMINOUS TRAILS.
Environmental research papers, Revised ed.,
by Dan Golomb, and Malcolm A. MacLeod. 7 Jan 66, 11p AFCRL-66-204, AFCRL-ERP-204
Proj. AF-7635
Task 763502
Revision of manuscript submitted 25 Oct 65.
Availability: Published in Journal of Geophysical Research v71 n9 p2299-2305 May 1 1966.

Descriptors: (*Upper atmosphere, *Diffusion), (*Chemiluminescence, Upper atmosphere).

Measurement of the radial growth of chemiluminous trails deposited in the upper atmosphere yields diffusion coefficients. The square of the Gaussian half-width of the cylindrical trail has been observed to increase linearly with time in the 107- to 160-km altitude region. The total inventory of radiating species varies because of chemical reactions, but this does not affect the radial growth. The measured diffusion coefficients are in good agreement with estimates using the 1965 Cospar international reference atmosphere. (Author)

AD-641 358 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ELECTRON AND PROTON OBSERVATIONS.
Environmental research papers,
by Ludwig Katz. Aug 66, 30p AFCRL-ERP-222, AFCRL-66-582
Projs. AF-8600, 0000
Tasks 860006, 000024
Pub. in Radiation Trapped in the Earth's Magnetic Field v5 p129-54 Aug 1965.

Descriptors: (*Electrons, Van Allen radiation belt), (*Protons, Van Allen radiation belt), (*Van Allen radiation belt, Charged particles), Terrestrial magnetism, Plasma medium, Electron density, Periodic variations, Cyclotron resonance phenomena, Upper atmosphere.

Results of the following trapped radiation experiments are discussed: 1-4 MeV electrons as observed during the fall of 1963 on a polar satellite, with an emphasis on the changes this population is subject to even at a period of relative solar quiet; 1 to 4 MeV protons obtained in a recent rocket flight near the equator up to L values of 3.7; 55 MeV protons observed periodically over a period of 4 years mirroring at the South Atlantic anomaly.

AD-641 359 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Auroral Observatory, Tromso (Norway).
AIO RESONANT SPECTRUM FOR UPPER ATMOSPHERE TEMPERATURE DETERMINATION.
Environmental research papers,
by Ove Harang. May 66, 34p
Contract AF 61 (052)-906
Proj. AF-7635
Task 963506
AFCRL-66-314, AFCRL-ERP-192
Prepared in cooperation with Northeastern Univ., Boston, Mass.; Contract AF 19 (628)-5731.

Descriptors: (*Upper atmosphere, *Atmospheric temperature), (*Aluminum compounds, Monoxides), (*Molecular spectroscopy, Upper atmosphere), Diatomic molecules, Clouds, Band spectrum, Solar radiation, Intensity, Atomic energy levels, Norway.

Identifiers: Chemical-release studies.

The release of diatomic species, in particular AlO, into the upper atmosphere at twilight results in luminous clouds that display the resonance electronic-vibrational rotational spectrum of the released species. The intensity distribution of the vibrational-rotational bands is temperature dependent. Assuming thermal equilibrium of the released species with ambient, the ambient temperature can be determined. Using the AlO molecular parameters, Franck-Condon factors, and the solar intensity in the upper atmosphere, the population of AlO in the vibrational and rotational levels and the relative band intensities are calculated, tabulated, and charted. These charts will be useful for upper atmosphere temperature measurements from AlO luminous clouds. (Author)

AD-641 367 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
Avco Corp., Wilmington, Mass. Avco Space Systems Div.
INFRASONIC MODES: AN OMNIBUS DIGITAL COMPUTER PROGRAM FOR THE STUDY OF ACOUSTIC-GRAVITY WAVE PROPAGATION,
by Allan D. Pierce. 5 Sep 66, 98p Scientific-7, AVSSD-0230-66-CR
Contract AF 19 (628)-3891
Proj. AF-7637
Task 763702
AFCRL-66-669

Descriptors: (*Atmosphere, *Acoustics), (*Programming (Computers), Atmosphere), Digital computers, Propagation, Sound transmission.

Identifiers: Wave propagation.

A computer program written in FORTRAN II for the purpose of studying guided infrasonic (acoustic-gravity) waves in the atmosphere is described. The deck listing of the main program and 43 subroutines is included. The program is based on the multilayer approximation which considers the atmosphere as consisting of a large number (up to 100) of layers, each having constant temperature and wind velocity. Such a model atmosphere may be chosen to approximate any continuously stratified model atmosphere. The report includes instructions for the operation of the program and examples of output. (Author)

AD-641 422 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
ITT Research Inst., Chicago, Ill.
AURORA AND AIRGLOW, ADVANCED STUDY INSTITUTE, KEELE (ENGLAND), AUGUST 15-26, 1966.
Final rept.,
by Billy M. McCormac, and W. O. Davies. Oct 66, 26p IITRI-T-6144
Contract N00014-66-C0331
Partially sponsored by NATO, ARO, and Institute. for Telecommunication Sciences and Aeronomy.

Descriptors: (*Aurorae, *Sky brightness), Training, Great Britain.

After over forty lectures and a vast amount of discussion on the various aspects of aurora and airglow, some effort should be made to present a conclusion. The Institute did not attempt to reach agreements or to determine popular opinion, but rather to see that the experimental and theoretical results were presented and adequately discussed. Each individual must make his own evaluation as to the importance and credibility of the information. Personal conclusions of the Institute are presented from the point of view of future research requirements. This Institute did much to identify important areas of agreement and disagreement and to focus attention on multidisciplinary research and on key problems for the future. The attendees concluded that another two-week Institute on Aurora and Airglow should be held in 1968. (Author)

AD-641 458 **Field 4A, 20H**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Physics.
ENERGY SPECTRUM FOR AURORAL-ZONE X RAYS. I. DIURNAL AND TYPE EFFECTS,
by J. R. Barcus, and T. J. Rosenberg. 10 Sep 65, 23p
Grant AF-AFOSR-331-63
Proj. AF-9751
Task 975104
AFOSR-66-1280
Availability: Published in Journal of Geophysical Research v71 n3 p804-23 Feb 1 1966.

Descriptors: (*X-ray spectrum, *Aurorae), Diurnal variations, Bremsstrahlung, Measurement, X rays, Terrestrial magnetism.

Balloon observations of X rays produced by energetic (equivalent to 50-250)Kev) electron precipitation into the auroral zone suggest a rather consistent diurnal pattern of occurrence for certain types of bremsstrahlung activity. Distinguishing spectral characteristics and variability, represented by approximate e-folding energies in the range 10-50 kev, are emphasized. Whereas the harder spectrums (Eo nearly equal to 25-50 kev) may be precipitated at any local hour, the softer spectrums (Eo nearly equal to 10-25 kev) appear primarily between the midnight and noon meridians. The softest spectrums (Eo nearly equal to 10-15 kev) observed in this energy range occur preferentially around midnight and into the early morning in association with pronounced negative magnetic bays and post-breakup auroral activity. The results suggest the existence of an intermediate spectrum (Eo nearly equal to 10-20 kev), in addition to the very soft (Eo < or equivalent to 5 kev) precipitation characteristic of the luminous aurora and the rather harder precipitation (Eo > or equivalent to 25 kev) characteristic of the 'average auroral-zone X-ray event. (Author)

AD-641 459 **Field 4A, 20H**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Physics.

SPATIAL AND TEMPORAL CHARACTER OF FAST VARIATIONS IN AURORAL-ZONE X RAYS,
by J. R. Barcus, R. R. Brown, and T. J. Rosenberg.27 Jul 65, 19p
Grant AF-AFOSR-331-63
Proj. AF-9774
Task 977402
AFOSR-66-0793
Availability: Published in Journal of Geophysical Research v71 n1 p125-41 Jan 1 1966.

Descriptors: (*X-ray spectrum, *Aurorae), Periodic variations, Bremsstrahlung, Intensity, X rays.

Fast pulsations, characterized by half-widths of 2-10 seconds and temporal spacings of 4-30 seconds, in the intensity of auroral-zone X rays have been investigated using simultaneous pairs of balloon-borne detectors with spatial separations of approximately 100-200 km. Such events, usually of an hour's duration, occur almost exclusively in the midnight to dawn sector (0200-0800 local hours) and appear preferentially on the equatorward side of the auroral zone. Spectral analysis shows the phenomena to be nonstationary but suggests the quasi-periods of 5-10 seconds ought to be considered a significant feature of the process responsible for such variations. Cross-correlation studies confirm the limited spatial extent of individual pulsations, on the average, and further indicate the possibility of longitudinal motions. Microburst events, characterized by scores of transient bursts each of about 200-msec half-width, occur most frequently around local noon, favoring the late morning and early afternoon. There appears to be little average latitude dependence across the auroral zone. Individual events, however, may be quite restricted in latitude. On one occasion, microbursts were observed for the better part of 3 hours at L-5.5 in the absence of similar activity at L=6.5, suggesting a rather localized magnetospheric origin. (Author)

AD-641 577 **Field 4A**
CFSTI Prices: HC$6.00 MF$1.25
Naval Research Lab., Washington, D. C.
WATER VAPOR OBSERVATIONS AT LOW, MIDDLE, AND HIGH LATITUDES DURING 1964 AND 1965.
Final rept.,
by H. J. Mastenbrook. 13 Sep 66, 207p NRL-6447
Grant NSF-GP-876
Proj. RF003-02-41-4251

Descriptors: (*Atmospheric sounding, Water vapor), Meteorological parameters, Tables, Hygrometers, District of Columbia, Trinidad, Greenland, Graphics.

Identifiers: IYQS.

The vertical distribution of water vapor to stratospheric levels has been measured over Washington, D. C.; Trinidad, West Indies; and Thule, Greenland, during 1964 and 1965, the period of the International Years of the Quiet Sun. The data for fifty-one soundings are presented individually in graphs and tables. (Author)

AD-641 696 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
SPECTRAL TRANSMISSIVITY OF THE EARTH'S ATMOSPHERE IN THE 250 TO 500 WAVE NUMBER INTERVAL. PART IV (FINAL). A THEORETICAL COMPUTATION FOR PURE ROTATIONAL ABSORPTION,
by James T. Hall, C. W. Querfeld, and G. B. Hoidale. Jul 66, 99p
Proj. DA-1L013001A91A
ECOM-5068
See also AD-467 000.

Descriptors: (*Absorption spectrum, Infrared radiation), (*Atmosphere, Wave transmission), Water vapor, Line spectrum.

A theoretical computation for absorption by water vapor, using the rigid asymmetrical top rotor for all angular momentum quantum numbers J < or = 12 and half-widths calculated by Anderson's theory, is compared to experimental data over the range of 20 microns to 50 microns. The comparison is made with consideration to determining the best of five line shapes for this spectral interval. The theoretical values of transmissivity are given for all five line shapes using the specific parameters of the experimental spectra. (Author)

AD-641 718 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE LARGE SEMI-ANNUAL VARIATION IN EXOSPHERIC DENSITY: A POSSIBLE EXPLANATION.
Technical rept.,
by G. E. Cook. Jul 66, 13p TR-66211

Descriptors: (*Exosphere, Periodic variations), Density, Great Britain, Atmosphere models, Orbital trajectories, Scientific satellites, Determination.

An analysis of the orbit of the satellite Calsphere 1 confirms the large semi-annual variation in density at heights near 1100 km previously found from the orbit of Echo 2, and not predicted by present atmospheric models. This variation is probably due to relatively smaller variations at much lower altitudes, in particular variations at heights near 120 km, which is taken as the lower boundary for the construction of upper-atmosphere models. (Author)

AD-641 795 **Field 4A, 3B**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Electrical Engineering Research Lab.
IONOSPHERIC RESEARCH.
Quarterly progress rept. no. 11, 1 Apr-30 Jun 66,
by H. D. Webb. Oct 66, 27p
Contract DA-36-039-AMC-03703 (E)
Proj. DA-3A99-20-001-04
ECOM-03703-11
See also AD-634 729.

Descriptors: (*Ionosphere, Scientific research), (*Moon, Reflection), Surface properties, Antennas, Solar flares, Magneto-optic effect.

Moon-reflected signals were received on 36 days for a total of approximately 378 hours at 150.6 mc and approximately 67 hours at 413.25 mc. Tables and a graph of observation times are presented. Calculations are virtually complete through the April observations. The influence of the April 15 solar flares is not evident in the data. Quarterly averages of electron content centered around March 21, June 21, and September 21 are presented. The one centered around Jun 21 shows the late afternoon maximum that appears in the summer. The gain of the 28 foot paraboloid using the sun as a source and a comparison method is 18.9 plus or minus 0.5 db. A phase-lock unit to keep the 150.6 mc receiver tuned is being built and installed as part of an automatically operated station. A coordinate converter to control the antenna was procurred. The evaluation of methods of resolving the n x 180 degrees ambiguity in lunar Faraday rotation data and the calculation of electron temperatures is being continued. The Atlas of Lunar Data for 1961 through 1964 is ready for printing Volume IV of the atlas, for 1965 data, is being prepared. (Author)

N66-32722 **Field 4A**
CFSTI Prices HC$2.50 MF$0.75
Trw Systems, Redondo Beach, Calif. Space Sciences Lab.
SURVEY OF VLF ELECTRIC FIELDS IN THE MAGNETOSPHERE WITH THE POLAR ORBITING SPACECRAFT, 1964-45A.
by G. M. Crook, R. W. Fredricks, and F. L. Scarf. 1965, 66p NASA-CR-71708, TRW-4455-6002-RU-000
Contract NASW-1226
Submitted For Publication

Descriptors: *Atmospheric electric field, *Electrometer, *Orbiting satellite, Ambient, Atmospheric, Electric, Electrostatic, Equilibrium, Field, Frequency, Instrumentation, Magnetosphere, Noise, Orbit, Oscillation, Plasma, Polar, Sampling, Satellite, Very low.

For abstract, see STAR 04 19.

N66-32793 **Field 4A**
CFSTI Prices HC$4.25 MF$1.75
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TIROS VII RADIATION DATA CATALOG AND USERS MANUAL. VOL. 4 - 1 OCTOBER 1964 19 JUNE 1965.
15 Jan 66, 305p NASA-TM-X-57805

Descriptors: *Instrument error, *Radiometry, *Tiros vii satellite, Chart, Correction, Data, Error, Instrument, Performance, Satellite, Temperature, Track.

For abstract, see STAR 04 19.

N66-33197 **Field 4A**
CFSTI Prices HC$5.50 MF$2.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
ELECTRON DENSITIES AND SCALE HEIGHTS IN THE TOPSIDE IONOSPHERE - ALOUETTE I OBSERVATIONS OVER THE AMERICAN CONTINENTS. VOLUME I - NOVEMBER 1962 - JANUARY 1963.
by K.-L. Chan, L. Colin, and J. O. Thomas. 1966, 508p NASA-SP-3027

Descriptors: *Alouette i satellite, *Ionospheric electron density, *Scale height, *Table, Analysis, Angle, Data, Density, Dip, Electron, Graph, Height, Index, Ionogram, Ionosphere, Latitude, Longitude, Magnetic, Measurement, North, Observation, Plasma, Scale, Topside, United states.

For abstract, see STAR 04 19.

N66-33418 **Field 4A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
SOME CHEMICAL ASPECTS OF UPPER-ATMOSPHERE RESEARCH.
by R. A. Hord, and H. B. Tolefson. 8 May 64, 14p NASA-TM-X-54833
Presented At The Chem. Section, Va. Acad. Of Sci., Charlottesville, 8 May 1964 Submitted For Publication

Descriptors: *Chemiluminescence, *Gas stream, *Trail, *Upper atmosphere, *Wind measurement, Agent, Atmosphere, Chemical, Gas, Measurement, Oxygen, Release, Stream, Upper, Vaporizer, Wind.

For abstract, see STAR 04 19.

N66-33419 **Field 4A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
THE SOLAR WIND AND ITS INTERACTION WITH THE MAGNETOSPHERE.
by C. P. Sonett. 1964, 46p NASA-TM-X-54880
Submitted For Publication

Descriptors: *Magnetosphere, *Particle collision, *Solar wind, Bow, Collision, Earth, Flow, Interaction, Particle, Power, Property, Region, Shock, Solar, Spectrum, Turbulence, Wind.

For abstract, see STAR 04 19.

N66-33431 Field 4A
CFSTI Prices HC$5.00 MF$1.25
Ling-temco-vought, Inc., Dallas, Tex. Ltv Astronautics Div.
SOLAR ACTIVITY CATALOGUE. VOLUME I - CATALOGUE OF SOLAR ACTIVITY DURING 1954 - 1956.
by H. Dodson-prince, E. R. Hedeman, and F. C. Jonah. 26 Feb 65, 176p NASA-CR-65217
Contract NAS9-2469
Center, 26 Feb. 1965 176 P Refs Its Rept.-00.594

Descriptors: *Geomagnetic storm, *Solar activity, *Sunspot, Activity, Balloon, Catalog, Data, Effect, Emission, Event, Flight, Geomagnetic, Plage, Radio, Region, Solar, Storm, Sun, Table, Terrestrial.

For abstract, see STAR 04 19.

N66-33443 Field 4A
CFSTI Prices HC$1.00 MF$0.50
Auburn Research Foundation, Inc., Ala.
EVALUATION OF DATA OBTAINED FROM A 35 G HZ PROPAGATION EXPERIMENT TECHNICAL REPORT NO. 7.
by E. R. Graf. Jan 66, 18p NASA-CR-76857
Contract NAS8-11184

Descriptors: *Atmospheric condition effect, *Electromagnetic wave, *Wave propagation, Analysis, Atmospheric, Attenuation, Condition, Data, Effect, Electromagnetic, Humidity, Pressure, Propagation, Signal, Strength, Temperature, Vapor, Water, Wave.

For abstract, see STAR 04 19.

N66-33523 Field 4A, 22B, 20N
CFSTI Prices HC$3.00 MF$0.50
National Committee For Space Research, Haifa (Israel). Radio Observatory.
IONOSPHERIC RESEARCH USING SATELLITES ANNUAL SUMMARY REPORT.
by J. Mass. 29 Dec 65, 53p AFCRL-66-383, AD-634910
Contract AF 61/052/-837

Descriptors: *Ionospheric electron density, *Receiving system, *Satellite measurement, Content, Density, Electron, Facility, Ionospheric, Irregularity, Measurement, Receiving, Research, Satellite, Station, System.

For abstract, see STAR 04 19.

N66-33701 Field 4A
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
SPECTRAL ALBEDO OF NATURAL GROUNDS.
Spektral'noye Al'bedo Yestestvennykh Podstilayushchikh Poverkhnostey
by K. YA.Kondratyev, Z. F. Mironova, and A. N. Otto. Jul 66, 26p NASA-TT-F-10229
Transl. Into English From Izd. Leningr. Univ., Probl. Fiz. Atmosfery (Leningrad), Issue 3, 1965 P 24-47

Descriptors: *Albedo, *Spectral reflectance, Absorption, Day, Diurnal, Measurement, Meteorology, Night, Plant, Reflection, Spectral, Surface, Table, Vegetation, Wavelength.

For abstract, see STAR 04 19.

N66-33703 Field 4A
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE GRAVITY POTENTIAL AND FORCE FIELD OF THE EARTH THROUGH FOURTH ORDER.
by C. A. Wagner. Aug 66, 65p NASA-TN-D-3317

Descriptors: *Earth, *Force field, *Gravitational potential, *Spacecraft trajectory, Field, Force, Fourth, Geophysics, Gravitational, Gravity, Laplace equation, Order, Perturbation, Potential, Rotation, Spacecraft, Trajectory.

For abstract, see STAR 04 19.

N66-37731 Field 4A
CFSTI Prices HC$2.00 MF$0.50
Weapons Research Establishment, Salisbury (Australia).
IONOSPHERIC DATA FOR FEBRUARY 1966 FROM SALISBURY, SOUTH AUSTRALIA IONOSPHERIC DATA BULLETIN.
May 66, 31p CPD-1966/2/S/

Descriptors: *Ionospheric composition, *Table, E layer, F layer, Hour, Ionosonde, Ionosphere, Ionospheric, Parameter.

For abstract, see STAR 04 23.

N66-37784 Field 4A
CFSTI Prices HC$2.00 MF$0.50
Weapons Research Establishment, Salisbury (Australia).
IONOSPHERIC DATA FOR DECEMBER 1965 FROM WOOMERA, SOUTH AUSTRALIA.
May 66, 32p WRE-CPD-1965/12/W/

Descriptors: *Ionosonde, *Ionosphere, *Table, Atmosphere, Australia, Data, Hour, Ionospheric, Parameter, Upper.

For abstract, see STAR 04 23.

N66-37998 Field 4A
CFSTI Prices HC$4.00 MF$0.75
New Hampshire Univ., Durham. Dept. Of Physics.
AN ELECTRIC FIELD METER FOR ROCKET AND SATELLITE USE.
by W. E. Potter. Sep 66, 107p NASA-CR-78444, UNH-66-4
Grant NSG-624

Descriptors: *Amplifier, *Atmospheric electric field, *Electrometer, *Rocket instrumentation, *Satellite instrumentation, Airborne, Aurora, Differential, Equipment, Ionosphere, Magnetosphere, Photoemissivity, Plasma, Probe.

For abstract, see STAR 04 23.

N66-38328 Field 4A
CFSTI Prices HC$2.00 MF$0.50
Travelers Research Center, Inc., Hartford, Conn.
RELATIONSHIPS BETWEEN TROPICAL PRECIPITATION AND KINEMATIC CLOUD MODELS FINAL TECHNICAL REPORT, 15 AUG. 1965 - 14 FEB. 1966.
by G. Arknason, and A. F. Saunders. May 66, 28p ECOM-01219-F, AD-632561
Contract DA-28-043-AMC-01219/E/
Its Rept.-9

Descriptors: *Cloud, *Moisture, *Static stability, *Thermal convection, Bubble, Buoyancy, Circulation, Computer, Convection, Dissipation, Equation, Formation, Kinematics, Model, Numerical, Stability, Static, Toroid, Tropical.

For abstract, see STAR 04 23.

N66-38343 Field 4A, 20I
CFSTI Prices HC$2.00 MF$0.50
Max-planck-institut Fur Physik Und Astrophysik, Munich (West Germany).
MOTION OF ARTIFICIAL ION CLOUDS IN THE UPPER ATMOSPHERE.
by G. Haerendel, R. Luest, and E. Rieger. May 66, 46p MPI-PAE/EXTRATERR.-27/66

Descriptors: *Artificial cloud, *Upper atmosphere, Ambipolar, Atmospheric, Barium, Cloud, Diffusion, Electric, Field, Interplanetary, Ion, Magnetic, Motion, Physics, Plasma, Sounding.

For abstract, see STAR 04 23.

N66-38364 Field 4A
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GEOMAGNETIC DISTURBANCES.
by M. Sugiura. 1965, 26p NASA-TM-X-57005
Submitted For Publication

Descriptors: *Geomagnetic storm, *Magnetic field disturbance, *Polar aurora, Activity, Area, Bay, Cap, Characteristic, Compression, Conjugate, Convection, Current, Electrojet, Emission, Flare, Hot plasma, Index, Line, Low latitude, Magnetosphere, Negative, Physical, Positive, Solar, Sun, System, Wind.

For abstract, see STAR 04 23.

N66-38722 Field 4A
CFSTI Prices HC$2.00 MF$0.50
Johns Hopkins Univ., Baltimore, Md.
ULTRAVIOLET MEASUREMENTS IN PLANETARY ATMOSPHERES.
by W. G. Fastie. 1966, 29p NASA-CR-78485
Grant NSG-193
Submitted For Publication

Descriptors: *Electronic equipment, *Optical spectrum, *Planetary atmosphere, *Rocket instrumentation, *Ultraviolet spectrophotometry, Airglow, Atmosphere, Aurora, Component, Earth, Electronic, Equipment, Experiment, Instrumentation, Optical, Planetary, Rocket, Spectrophotometry, Spectrum, Ultraviolet.

For abstract, see STAR 04 23.

N66-38802 Field 4A
CFSTI Prices HC$2.50 MF$0.75
Mount Auburn Research Associates, Inc., Cambridge, Mass.
ANALYTIC AND COMPUTER STUDIES OF ELECTRON COLLECTION BY A SPHERICAL SATELLITE IN THE EARTH'S MAGNETIC FIELD.
by L. W. Parker. Oct 66, 80p NASA-CR-618
Contract NAS5-9228

Descriptors: *Electron beam, *Magnetic field, *Satellite, Calculation, Collection, Collision, Computer, Current, Density, Dimensional, Model, One, Solution, Spherical, Study, Trajectory.

For abstract, see STAR 04 23.

PB-173 429 Field 4A, 7D
CFSTI Prices: HC$3.00 MF$0.75
Johns Hopkins Univ., Baltimore, Md. Lab. of Astrophysics and Physical Meteorology.
STRENGTH-HALF-WIDTH PRODUCTS OF SELF-BROADENED LINES IN THE 6.3 MICRON BAND OF WATER VAPOR.
Final rept.,
by Dianne K. Prinz. Jul 66, 78p
Contract Cwb-10899

Descriptors: (*Water vapor, *Absorption spectrum), Line spectrum, Band spectrum, Interferometers, Lasers, Instrumentation, Calibration.

Absorption spectra of ten self-broadened lines in the 6.3 micron band of water vapor were obtained using a 100 foot long absorption cell with water vapor concentrations between 0.0092 pr. cm and 0.042 pr. cm. With an optical path of 19800 cm,

all of the lines were in the square root region of the curve of growth. A procedure for adjusting the 100% transmission line was devised which eliminated that part of the absorption due to wings of distant lines which was constant over the integration interval. The strength-half-width product for each of the ten lines was then obtained from the resultant curve of growth. The results are compared with other values in the literature; the limitations and implications of the adjusting procedure are discussed.

AD-641 339 See Field 5A

AD-641 454 See Field 7D

AD-641 467 See Field 20H

AD-641 481 See Field 18C

AD-641 821 See Field 6M

AD-641 823 See Field 6M

AD-641 825 See Field 6M

AD-641 848 See Field 7D

N66-33118 See Field 3B

4B. METEOROLOGY

AD-641 560 **Field 4B, 16A**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
THE RICHARDSON NUMBER IN THE PLANETARY BOUNDARY LAYER,
by Frank V. Hansen. May 66, 33p
Task 1V014501B53A-10
ECOM-5053

Descriptors: (*Atmospheric motion, *Guided missile ranges), Numerical methods and procedures, Wind, Boundary layer, Atmospheric temperature, Stability, Micrometeorology.

Determination of the stability regime is a basic approach in any investigation of atmospheric turbulence. The establishment of stability criteria in the boundary layer is usually accomplished by use of the nondimensional Richardson number. The computation of accurate Richardson numbers is shown to be adversely affected by a number of factors including the choice of vertical gradients, the terrain, spacing of instruments, and heterogeneous profiles of wind and temperature. (Author)

AD-641 574 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.75
Cambridge Systems, Inc., Newton, Mass.
DESIGN, DEVELOPMENT AND TESTING OF AN ACOUSTIC ANEMOMETER.
Final rept. 1 Jun 63-31 May 66,
by David J. Beaubien, Arthur Bisberg, and Arthur Pappas. 31 May 66, 67p
Contract AF 19 (628)-2988
Proj. AF-6682
Task 668202
AFCRL-66-650

Descriptors: (*Anemometers, Acoustic equipment), Design, Transducers, Display systems, Performance (Engineering).

This report covers the development and testing of an acoustic anemometer which provides an instantaneous visual display of wind speed. The anemometer system consists of three units: an acoustic transducer array consisting of three orthogonally mounted transducer-pairs which sense the wind velocity components, a transmit unit which analyzes the information provided by the array, and a display unit offering a visual presentation of the electrical data developed at the transmitter unit. The system is intended to provide a measurement range of 0 to 150 knots, with a resolution of 1 knot. The overall accuracy for the system is plus or minus 3% of the reading, plus or minus one digit. An extensive laboratory and field test program, designed to verify the suitability of the system for use in extreme climates was conducted, and the results of these tests are presented. The system described is intended for operational use at missile sites and ranges. (Author)

AD-641 579 **Field 4B**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
WIND AND TEMPERATURE DATA FOR THE FIRST 62 METERS OF THE BOUNDARY LAYER AT WHITE SANDS MISSILE RANGE.
Data rept.,
by Frank V. Hansen. Sep 66, 47p
Task 1V014501B53A-10
ECOM-5079

Descriptors: (*Meteorological parameters, New Mexico), Wind, Velocity, Boundary layer, Low altitude, Guided missile ranges, Temperature.

Twenty-minute wind and temperature profiles observed in the first 62 meters of the boundary layer at White Sands Missile Range are presented. The 147 profiles were selected because these research quality data are considered representative of conditions over an extremely rough nonhomogeneous surface in a semi-arid region. (Author).

AD-641 668 **Field 4B**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands, Missile Range, N. Mex.
UPPER WIND CORRELATIONS IN THE CENTRAL ROCKY MOUNTAINS,
by Roy L. Lamberth, and Manuel Armendariz. Jun 66, 47p
Task 1V014501B53A-10
ECOM-5061

Descriptors: (*Wind, Correlation techniques), Weather forecasting, Colorado, Utah, Nevada, Wyoming, Tables, High altitude.

Vector correlation coefficients of winds from 3 through 24 kilometers mean sea level at Grand Junction, Colorado; Salt Lake City, Utah; Ely, Nevada; and Lander, Wyoming; and between Grand Junction and these stations are presented by season in tabular form. Both synchronous and lagged values are included for interlevel and intralevel relationships. A simple technique for using the correlations as a forecast tool, including the necessary constants, is presented. By simple linear regression it is shown that wind predictions for Grand Junction may be used for Green River, Utah, with accuracy adequate for scheduling missile launchings. (Author)

AD-641 692 **Field 4B, 17I**
Not available from CFSTI.
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
SWEPT FREQUENCY MEASUREMENT OF WATER-DROP DIAMETER.
Physical sciences research papers,
by Martin R. Stiglitz. 11 Feb 66, 6p AFCRL-66-662, AFCRL-PSRP-270
Proj. AF-4600
Task 460003
Availability: Published in IEEE Transactions on Antennas and Propagation vAR-14 n4 p509-10 Jul 1966.

Descriptors: (*Raindrops, Measurement), Drops, Particle size, Resonant frequency, Meteorological radar, Electromagnetic waves, Absorption.

It is well known that a plane polarized electromagnetic wave incident upon a dielectric sphere will induce electric and magnetic dipoles within the sphere. If these spheres are low loss high dielectric constant materials, they act as dielectric resonators. Water drops will also resonate in the H sub 110 mode and the resonant frequencies are a function of the diameter of the water drop. Thus by measuring the resonant frequency of the water-drop its size can be computed. (Author)

AD-641 744 **Field 4B, 16A**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, New Mex.
WIND SHEAR CALCULATIONS FOR SMALL SHEAR LAYERS,
by Manuel Armendariz, and Laurence J. Rider. Jun 66, 24p
Proj. DA-1V014501B53A-10
ECOM-5057

Descriptors: (*Wind, Guided missile ranges), Shear stresses, Anemometers, Thickness, Radiosondes, Phototheodolites.

Identifiers: Shear flow.

Wind shear computed from data obtained at Cape Kennedy using a Jimsphere wind sensor and an AN/FPS-16 radar to track the sensor is compared with wind shear computed from three other wind measuring systems: namely, rawinsonde, rocketsonde, and Contraves cinetheodolite. This comparison indicates that the Jimsphere winds were subjected to considerable smoothing. In particular, the slope of a line on a log-log representation depicting the exponential relationship between layer thickness and wind shear is found to decrease as the wind profile is smoothed. The observed wind shear for an 82-foot layer thickness (as derived from Jimsphere wind data) is compared with the theoretical value computed using an exponential relationship between wind shear and layer thickness. Differences are less than 0.2 foot/sec for the 82-foot layer approximately 75% of the time. (Author)

AD-641 837 **Field 4B**
Not available from CFSTI.
Environmental Science Services Administration, Boulder, Colo. Inst. for Telecommunication Sciences/Aeronomy.
INFRASONIC OBSERVATION OF A SEVERE WEATHER SYSTEM.
Revised ed.,
by V. H. Goerke, and M. W. Woodward. 28 Mar 66, 4p
Revision of manuscript submitted Dec 10, 1965.
Availability: Published in Monthly Weather Review v94 n6 p395-8 Jun 1966.

Descriptors: (*Storms, Atmospheric sounding), Ionosphere, Pressure, Mechanical waves, Leading edge, Extremely low frequency.

The coherent atmospheric pressure waves traveling at sonic velocities from a squall line storm 20-75 km. distant were observed in detail for a period of 100 min. The measurements indicate that the infrasonic wave was generated in or near the leading edge of the storm. Infrasonic waves were not observed from funnel clouds or from the heavy rain clouds accompanying the storm front. (Author)

AD-641 988 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
Weather Squadron (29th), Duluth, Minn. Detachment 9.
THETA PRIME CHART,
by Norman G. Wiley. 31 May 66, 14p Rept. no. 29660001

Descriptors: (*Meteorological charts, Atmospheric temperature), Weather forecasting, Stability, Air mass analysis, Meteorological parameters.

A practical approach to the utilization of a Theta Prime Chart as a local forecasting tool. It includes a description of how to obtain and plot the data;

recommends an analysis procedure; explains the meaning of a variety of possible features of the analysis and presents a number of Empirical Rules. (Author)

N66-33119 Field 4B
CFSTI Prices HC$2.00 MF$0.50
Canada. Dept. Of Transport, Toronto. Meteorological Branch.
THE IDENTIFICATION AND MOVEMENT OF MESO-SCALE THUNDERSTORM SYSTEMS.
by E. C. Jarvis. 14 Dec 65, 28p CIR-4346, TEC-591

Descriptors: *Identification, *Thunderstorm, *Weather forecasting, Field, Forecasting, Mesoscale, Moisture, Motion, Pattern, System, Troposphere, Weather, Wind.

For abstract, see STAR 04 19.

N66-33205 Field 4B
CFSTI Prices HC$2.00 MF$0.50
Canada. Dept. Of Transport, Toronto. Meteorological Branch.
VERIFICATION OF OBJECTIVE FORECASTS AT THE CENTRAL ANALYSIS OFFICE OF THE METEOROLOGICAL SERVICE OF CANADA.
by D. L. Holyoke. 22 Oct 65, 32p CIR-4320, TEC-585

Descriptors: *Digital computer, *Meteorological service, *Weather forecasting, Analysis, Atmosphere, Barotropism, Canada, Computer, Digital, Forecasting, Geography, Grid, Hemisphere, Meteorology, Model, Numerical, Objective, Parameter, Physical, Prediction, Scheme, Service, Table, Verification, Weather.

For abstract, see STAR 04 19.

N66-33391 Field 4B
CFSTI Prices HC$2.00 MF$0.50
White Sands Missile Range, N. Mex. Atmospheric Sciences Lab.
METEOROLOGICAL DATA REPORT, AEROBEE NASA 4.106 NP (9 MAY 1966).
by M. M. Hoidale. May 66, 33p NASA-CR-76571, DR-30

Descriptors: *Aerobee rocket, *Ballistics, *Meteorological flight, *Table, Calculation, Data, Direction, Flight, Impact, Launch, Meteorology, Performance, Rocket, Speed, Wind.

For abstract, see STAR 04 19.

N66-33760 Field 4B
CFSTI Prices HC$2.00 MF$0.50
Weather Bureau, Washington, D. C.
METEOROLOGICAL CONSIDERATIONS IN THE HANDLING OF A MIXTURE OF LIQUID FLUORINE AND LIQUID OXYGEN.
by R. K. Siler. 15 Oct 64, 49p NASA-CR-62579, AD-608118
Prepared For Nasa

Descriptors: *Fluorine-liquid oxygen (flox), *Meteorology, Atmosphere, Chemical, Climatology, Compound, Diffusion, Flox, Fluorine, Gas, Handling, Liquid, Mixture, Oxygen, Physical, Property, Weather.

For abstract, see STAR 04 19.

N66-38420 Field 4B
CFSTI Prices HC$2.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
TIROS RADIATION MEASUREMENTS AND VARIATIONS IN ATMOSPHERIC HEATING.
by P. A. Davis. Oct 66, 53p NASA-CR-581
Contract NAS5-9540

Descriptors: *Atmospheric heating, *Radiation measurement, *Tiros vii satellite, Cooling, Diabatic, Infrared, Meteorology, Reflection, Satellite, Solar, Variation, Window.

For abstract, see STAR 04 23.

N66-38715 Field 4B
CFSTI Prices HC$1.00 MF$0.50
Army Missile Command, Huntsville, Ala. Translation Branch.
MESOMETEOROLOGY AND THE POSSIBILITIES OF FORECASTING LOCAL WEATHER.
by E. Bodolai, and G. Goetz. 27 May 66, 14p NASA-CR-78526, RSIC-562
Transl. Into English From Idojaras (Budapest), V. 66, No. 6, 1962 P 361-366 Sponsored Jointly With Nasa

Descriptors: *Meteorology, *Upper atmosphere, *Weather forecasting, Air, Analysis, Atmosphere, Forecasting, Local, Mass, Mesosphere, Motion, Precipitation, Upper, Weather.

For abstract, see STAR 04 23.

N66-38717 Field 4B
CFSTI Prices HC$1.00 MF$0.50
Army Missile Command, Huntsville, Ala. Translation Branch.
AN EXPERIMENT ON THE QUANTITATIVE DESCRIPTION OF CLIMATIC ELEMENT FIELD BY ORTHOGONAL FUNCTIONS.
by Y.-N. Shih. 18 Jul 66, 25p NASA-CR-78502, RSIC-578
Transl. Into English From Acta. Met. Sinica (Peking), V. 35, No. 3, 1965 P 343-351 Sponsored Jointly With Nasa

Descriptors: *Climatology, *Orthogonal function, *Quantitative analysis, *Space-time function, Analysis, Approximation, Calculation, Description, Element, Experiment, Field, Formula, Function, Orthogonal, Quantity, Space, Time.

For abstract, see STAR 04 23.

PB-173 423 Field 4B
CFSTI Prices: HC$4.00 MF$0.75
Travelers Research Center, Inc., Hartford, Conn.
A STATISTICAL APPROACH TO THE 12-48-hr PREDICTION OF PRECIPITATION PROBABILITY.
Final rept.,
by John A. Russo, Jr., Isadore Enger, and Guy T. Merriman. Aug 66, 104p Rept. no. 7671-217
Contract Cwb-11100

Descriptors: (*Atmospheric precipitation, Probability), Mathematical prediction, Statistical analysis, Weather forecasting, Atmospheric motion, Humidity.

The Regression Estimation of Event Probabilities technique (REEP) is applied, in a generalized framework, to predict precipitation probabilities for periods of 12-24, 24-36, and 36-48-hr at a number of U.S. stations, east of the Rockies. The predictors are physically meaningful variables derived from 1000-500- and 700-mb height fields and adjusted for local effects. Additional predictors are used to account for diurnal, seasonal, and climatological variations. Analysis of the predictors selected by the REEP procedure showed that the most important predictors are related directly or indirectly to the most causal precipitation factors-vertical motion and moisture. The most useful predictors are the 1000- and 500-mb geostrophic vorticities, the advection of geostrophic vorticity in various height and thickness fields, an upslope motion parameter, and a variable denoting the strength of flow from or away from a moisture source. Through analysis of a number of scores including the P-score, threat score, and Heidke skill score, it is concluded that the objectively derived generalized REEP equations give a reasonable representation of precipitation probabilities and appear to offer valuable guidance for the operational forecaster, especially in the 36-48-hr period where a deterioration in skill of the operational forecasts was noted. (Author)

PB-173 426 Field 4B
CFSTI Prices: HC$1.00 MF$0.50
Weather Bureau, Washington, D. C. Weather Analysis and Prediction Div.
PERFORMANCE OF THE 6-LAYER BAROCLINIC (PRIMITIVE EQUATION) MODEL.
Notes to forecasters,
by Julius Badner. Sep 66, 20p WB-TM-FCST-5

Descriptors: (*Mathematical models, *Weather forecasting), Effectiveness.

Identifiers: Primitive equation.

Comparison of 500 mb progs from the 6-layer primitive equation baroclinic and the 3-level baroclinic models during the test period indicated a slight superiority of the former in the average in terms of S1 score. The 6-layer model was definitely superior in two-thirds of the cases during the test period with an improvement of nearly 11 percentage points in skill over persistence. This in itself may not have been sufficient to warrant a substitution for the 3-level model but the potentialities of the new model for better forecasts at other levels, and derivatives of these forecasts, were great. This was confirmed by the very definitely superior performance of the 6-layer model surface prog over the comparable Reed progs made with the 3-level model and the very good showing of the 36 hour numerical progs as compared to the independently produced subjective 30 hour A and FD progs during the test period. The new model is still in a shakedown period; changes in the program are being introduced from time to time. More definitive studies of the performance will be made during the more active fall and winter seasons. For one, subjective examination of the 500 mb progs appeared to indicate that short wave troughs were moved too slowly by the model. The introduction of the 'desmoothing' operator was expected to correct this fault, if it is one, but no evidence is yet available to confirm this. (Author)

PB-173 427 Field 4B
CFSTI Prices: HC$3.00 MF$0.75
Weather Bureau, Washington, D. C. Equipment Development Lab.
INFRARED CLOUD COVER DETECTOR.
Technical note,
by Ferdinand H. Zegel. May 66, 85p WB-TN-41-EDL-1

Descriptors: (*Meteorological instruments, Infrared detectors), (*Infrared detectors, Cloud cover), Temperature sensitive elements, Meteorology, Meteorology parameters, Weather stations, Electromagnetic properties, Instrumentation, Heat flux, Radiometers, Bolometers.

Described herein is the design analysis of the observational data produced by a new application of meteorological sensors. This sensor, an infrared cloud cover indicator, utilizes the fact that any object having a temperature above absolute zero will radiate electromagnetic energy. The energy radiated by cool objects (in the 200 to 500 K range) is concentrated in the deep infrared region of the electromagnetic spectrum and is sensed by this detector. The number of 'hot spots' seen by the indicator during its scanning period is integrated into a total amount of cloud cover. As explained in the body of this report some engineering difficulties have been experienced with the present instrument; however, the physical principles governing operation of the unit have proved successful. (Author)

PB-173 433 Field 4B
CFSTI Prices: HC$3.00 MF$0.75
GCA Corp., Bedford, Mass.

METEOROLOGICAL VARIABLES CRITICAL TO GEOMETRY OF HURRICANE SPIRAL BANDS.
Final rept.,
by Wen Tang. Aug 66, 59p GCA-TR-66-17-G
Contract Cwb-11191

Descriptors: (*Tropical cyclones, *Meteorological parameters), Clouds, Geometry, Convection (Atmospheric), Stability, Wind, Atmospheric temperature.

A simple model is developed to investigate the meteorological variables that affect the geometry of hurricane spiral bands. In this model, the geometry of the spiral bands is obtained from the horizontal wave numbers of the vertical velocity oscillation that results from the solution of a three-dimensional, convective model of a hurricane. From the point of view of maximum growth rate, results show that the thermal stability is the dominating meteorological parameter affecting both the angle between the cloud band and the tangential wind direction (cross-angle) and the spacing of the spiral bands. The more unstable the atmosphere, the smaller the cross-angle and the smaller the spacing between cloud bands. For slightly unstable cases, the vertical shear of tangential wind is also important. In these cases, the larger the vertical shear of tangential wind, the larger the cross-angle and the larger the spacing. The radial wind component, in this simplified model is shown to have only a minor effect on the geometry of the spiral bands. An improved model is developed and various mathematical methods for solving the governing equations are investigated. Suggestions for future continuing investigations are outlined. (Author)

PB-173 452 **Field 4B**
CFSTI Prices: HC$5.00 MF$1.00
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
PROJECT WHITETOP. PART I. DESIGN OF THE EXPERIMENT. PART II. SUMMARY OF OPERATIONS.
Final rept.,
by Roscoe R. Braham, Jr. Aug 66, 151p
Report on a Convective Cloud Randomized Seeding Project. Research supported in part by NSF.

Descriptors: (*Atmospheric precipitation, *Missouri), (*Artificial precipitation, Missouri), Experimental design, Clouds, Meteorological radar, Meteorological parameters, Meteorological instruments, Site selection.

Identifiers: Whitetop project.

Project Whitetop was a coordinated laboratory and field study of the physics of precipitation development in summer convective clouds of Missouri. The objectives were twofold, (a) to further elucidate the physics of rain production in summer convective clouds of the mid-continent, and (b) to investigate, by means of a randomized cloud seeding project, the effect of silver-iodide seeding in altering either the physical character of the clouds or the rainfall from them. Details of the period and location of this research effort, the design of the cloud seeding experiment, and a summary of the field operations during the five summers of the experiment form the basis for this report.

AD-260 695 **See Field 2C**

AD-641 330 **See Field 8C**

5A. ADMINISTRATION AND MANAGEMENT

AD-641 336 **Field 5A, 14A, 15E**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
NOTES ON INCENTIVE CONTRACTING,
by K. L. Deavers, and J. J. McCall. Sep 66, 36p RM-5019-PR
Contract AF 49 (638)-1700

Descriptors: (*Air force procurement, Costs), Decision making, Management planning, Cost effectiveness, Mathematical analysis.

Identifiers: Contracts.

A discussion is presented of two related aspects of incentive contracting: (1) interpretive problems that arise in implementing incentive contracts and (2) the relationship between sharing rates and different aspects of contract cost. The interpretive problems center around the effect of risk on contractors in weapon procurements and the presently undeterminable effect of different sharing rates on the initial targets that firms submit on incentive contracts. The authors present empirical analyses of data for 252 AF incentive contracts: 126 completed between 1959 and 1962, and 126 of the 1962-1963 period. (Author)

AD-641 339 **Field 5A, 12A, 4A, 3B K**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
FOREIGN SCIENCE BULLETIN, VOL. 2, NO. 10.
Oct 66, 64p
TT-66-62545
A monthly review of selected foreign scientific and technical literature, See also AD-637 218.

Descriptors: (*Scientific research, Reports), Game theory, Atmosphere, Infrared radiation, Heat-resistant plastics, Moon, Cosmic rays, Atmospheric motion, Photographic techniques, Explosions, Thermal stability, Polymers, Cryogenics, Light transmission, Crystal structure, Lasers.

Contents: Papers - the pursuit problem and the theory of differential games; measurement of the angular and spectral distribution of atmospheric infrared radiation by the Kosmos-45 satellite; current Soviet research in the field of heat-resistant polymers: polyimides, polyoxazoles, and poly-1, 3, 4-oxadiazoles; Science ; technology notes - the intensity of penetrating radiation on the moon's surface; the nature of the lunar surface as determined from gamma-ray spectra obtained by Luna 10; measurements of cosmic-ray intensity; spectrophotometric measurements of the Moon analysis of lunar photographs; lunar ultraviolet spectrum; study of upper atmosphere wind circulation by the radar method; laser photography; passive Q-switching of a ruby laser with bleachable phthalocyanines; modeling large cratering explosions; study of the thermal stability of several new polybenzimidazoles which contain O, P, and B in the chains, and also of mixed polyamido- and polyesterobenzimidazoles by differential thermal analysis; Conferences - conference on low-temperature physics; Book reviews - transparency of the atmosphere to visible and infrared rays; crystal structure of arsenides, sulfides, arsenosulfides, and their analogs; the laser in communication systems.

AD-641 365 **Field 5A, 15E**
CFSTI Prices: HC$1.00 MF$0.50
Rome Air Development Center, Griffiss AFB, N. Y.
MAINTAINABILITY DEMONSTRATION MIL-STD-471,
by Frank D. Mazzola. Oct 66, 22p RADC-SP-66-10

Descriptors: (*Maintainability, Military requirements), Management planning, Weapon systems, Maintenance, Standards, Military publications, Test methods, Department of Defense.

The paper describes MIL-STD-471 'Maintainability Demonstration' which was prepared by a tri-service Department of Defense Task Group. It describes, briefly, the background and problems leading to the development of the Standard, as well as its organization and the requirements and procedures-contained therein.

AD-641 405 **Field 5A, 20K, 20B, 11F K**
CFSTI Prices: HC$5.00 MF$1.00
Brown Univ., Providence, R. I.
MATERIALS SCIENCES PROGRAM.
Annual technical rept. no. 5, 1 Jul 65-30 Jun 66. 30 Jun 66, 158p
Contract SD-86
See also AD-622 774.

Descriptors: (*Scientific research, *Materials), Wave transmission, Viscoelasticity, Solid state physics, Crystallography, Semiconductors, Chemistry, Metallurgy, Geology, Acoustics, Mechanics.

This Fifth Annual Technical Report outlines research in the materials sciences at Brown University for the period 1 July 1965 to 30 June 1966. Work carried out in the divisions of engineering and applied mathematics and the departments of chemistry, physics and geological sciences is described.

AD-641 423 **Field 5A, 5I, 5J**
CFSTI Prices: HC$6.00 MF$1.25
Wisconsin Univ., Milwaukee. Center for Advanced Study in Organization Science.
ORGANIZATIONAL FACTORS IN SCIENTIFIC PERFORMANCE IN AN INDUSTRIAL RESEARCH LABORATORY.
Final technical rept.,
by Clagett G. Smith. Oct 66, 203p
Contract Nonr-4743 (00)
Proj. NR-177-265

Descriptors: (*Industrial research, Scientific personnel), (*Scientific personnel, Performance (Human)), (*Personnel management, Industrial research), Applied psychology, Scientific research, Group dynamics, Aging (Physiology), Decision making, Sociometrics, Social communication, Motivation, Attitudes, Creativity, Personality.

The research constituted an investigation of organizational factors in scientific performance. A number of hypotheses were tested within a theoretical framework whose major premise states that outstanding achievement in science requires an 'essential tension' between an orientation toward tradition or wisdom and toward innovation or novelty. Work of highest significance is believed to occur in the simultaneous presence of conditions emphasizing wisdom and of those emphasizing novelty. Specifically, several sources of wisdom and novelty were examined as they arose from individual patterns of consultation, from processes occurring within the work group, and from certain aspects of organizational structure. These variables provided substantial predictions of scientific performance, particularly at the work group and organizational level. Thus, the findings partially substantiate the theory while at the same time suggesting certain modifications applicable in the administration of industrial research laboratories. (Author)

AD-641 438 **Field 5A**
CFSTI Prices: HC$2.00 MF$0.50
Carnagie Inst. of Tech., Pittsburgh, Pa. Management Sciences Research Group.
AUDIT RECOMMENDATIONS AND MANAGEMENT AUDITING: A CASE STUDY AND SOME REMARKS.
Research rept.,
by Neil C. Churchill. Oct 66, 45p MSRR-85
Contract Nonr-760 (24)
Proj. NR-047-048

Descriptors: (*Management control systems, Navy), (*Management engineering, Decision making).

The paper examines from a managerial viewpoint the implications of two developments closely allied to auditing -- the making of audit recommendations and the shift in emphasis toward the evaluation of management functions. The basis for the remarks is the field work carried out on the internal

audit activities of the U. S. Navy -- the Naval Audit Service. The structure and activities of the Naval Audit Service are briefly described as are the types of audits they perform. These audits are catagorized as fidelity, complience, or managerial audits and the characteristics of each examined as to both methodology and effect. Extensions are then made to similar audit activities in the industrial area possible consequences of each are hypothesized. (Author)

AD-641 442 **Field 5A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
ORIGIN AND HISTORY OF PROGRAM BUDGETING.
by David Novick. Oct 66, 12p P-3427

Descriptors: (*United States Government, Budgets), (*Federal budgets, *Management planning), Decision making, Systems engineering, Cost effectiveness, Department of Defense, Management control systems.

The report is concerned with the origin and history of program budgeting which is currently being applied to all the executive Offices and Agencies of the United States Government. The concept, used so successfully today by the Department of Defense, and utilized as part of the wartime control system in 1942, was recognized and applied as early as 1924 by industry.

AD-641 652 **Field 5A, 5I, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Pittsburgh Univ., Pa. Management Research Center.
SOME EFFECTS ON BUSINESS GAMING OF PREVIOUS QUASI-T GROUP AFFILIATIONS.
Technical rept.,
by Sam Deep, Bernard M. Bass, and James A. Vaughan. 1 Sep 66, 22p TR-12
Contract Nonr-624 (14)

Descriptors: (*Game theory, *Management engineering), (*Group dynamics, Training), Commerce, Decision making, Combinatorial analysis, Experimental design, Students.

Ninety-three graduate business students at the University of Pittsburgh were assigned to nine 'companies' to play the Carnegie Tech Management Game. The game was the major portion of a 15-week course in integrated decision-making. Men were assigned to 'companies' according to whether they had been in the same or different quasi-T groups 15 weeks earlier. 'Companies' composed of two and three sub-divided ex-T groups performed significantly more effectively in the game than 'companies' made up of wholly reconstituted sensitivity training groups. The latter reported less internal conflict but appeared to be less effective as companies because of overconfidence in each other's dependability. (Author)

AD-641 851 **Field 5A, 20L, 20I, 20D K**
CFSTI Prices: HC$6.00 MF$1.25
Illinois Univ., Urbana. Coordinated Science Lab.
PROGRESS REPORT FOR MARCH-AUGUST, 1966.
31 Oct 66, 214p
Contract DA-28-043-AMC-00073 (E), Grant NsG-443
Proj. DA-20014501B31F
See also AD-631 712.

Descriptors: (*Physics, Scientific research), (*Plasma physics, Scientific research), (*Electronics, Scientific research), (*Astronautics, Scientific research), (*Computers, Scientific research), Surfaces, Vacuum apparatus, Solid state physics, Superaerodynamics, Upper atmosphere, Teaching machines, Data processing systems, Display systems, Infrared optical systems, Information retrieval, Networks, Control systems, Structures, Switching circuits.

Research progress in the following areas is reported: surface physics, applied physics, plasma physics, rarefied gas dynamics, high-voltage breakdown, space sciences, Plato, computer systems and applications, plasma display, infrared converter, information science, networks, control systems, structural-system design, switching systems.

AD-641 921 **Field 5A**
CFSTI Prices: HC$9.10 MF$2.75
Air Force Systems Command, Washington, D. C.
PROCEEDINGS OF THE ANNUAL AIR FORCE SCIENCE AND ENGINEERING SYMPOSIUM (13th), 27-28-29 SEPTEMBER 1966, ARNOLD ENGINEERING DEVELOPMENT CENTER, ARNOLD AIR FORCE STATION, TENNESSEE. VOLUME I. UNCLASSIFIED, UNCONTROLLED DISTRIBUTION VOLUME.
29 Sep 66, 611p
See also AD-641 922, AD-641 923.

Descriptors: (*Symposia, *Air force research), Scientific research, Engineering.

Contents: Adaptive Bang-Bang Control of an Unstable Mechanical System Containing an Unknown Parameter; Rotation/Go-Around Instrument Guidance System; Accelerations on Aircraft Induced by the Earth's Rotation; A Tandem Mass Spectrometer for the Study of Ion-Molecule Reactions; A New Technique for the Direct Determination of Vibrational Transition Probabilities; Experimental and Theoretical f-Values for Wavelengths 3076 Zn I, 3261 Cd I and 2537 Hg I; Studies of Surface Layer Transport and Its Contributions to the Properties of Ceramic Materials; Impulse Facilities for Scramjet Research and Development; Supersonic Combustion Simulation for High Mach Number Flight; Hydrocarbon Fuels for Hypersonic Vehicles; Real Time Tem-Mode Analysis of He-Ne Lasers; Lasing Potential of II-VI Compounds; Laser Brightness Gain and Mode Control by Compensation for Thermal Distortion; Laboratory Investigations of Plasma Interactions with a Dipole Magnetic Field; Rapid Remote Sensing by Spectrum Matching Technique: Application in the Laboratory and in Lunar Observations; Environmental System Development for Rapid Decompression of Chimpanzees to Pressures Less than Two Torr; Filament Wound Aircraft Tires; Use of Tuned Viscoelastic Dampers for Reduction of Vibrations in Aerospace Structures; Progress Report - Development of Advanced Composite Structures; Ultrasonic Studies of 1060 and 6061-T6 Aluminum.

AD-641 922 **Field 5A**
CFSTI Prices: HC$9.55 MF$2.75
Air Force Systems Command, Washington, D. C.
PROCEEDINGS OF THE ANNUAL AIR FORCE SCIENCE AND ENGINEERING SYMPOSIUM (13th), 27-28-29 SEPTEMBER 1966, ARNOLD ENGINEERING DEVELOPMENT CENTER, ARNOLD AIR FORCE STATION, TENNESSEE. VOLUME II. UNCLASSIFIED, UNCONTROLLED DISTRIBUTION VOLUME.
29 Sep 66, 653p
See also AD-641 921, AD-641 923.

Descriptors: (*Symposia, *Air force research), Scientific research, Engineering.

Contents: Confronting the Heat Protection Problem in Hypersonic Nozzles Using High Enthalpy Air; Use of Flightpath Accelerometers in Performance Flight Testing; Application of Nucleonic Mass Measurement Techniques for Measurement of Two-Phase Fluid Conditions Existing in Aircraft Fluid Systems; Thin Film Heat Transfer Gages; Performance Analysis of Aircraft Subsystems Based on Automatic Airborne Data Acquisition; Analysis of Radioisotope Dynamic Power Systems for Future Military Space Programs; Gemini Performance Optimization; Design, Fabrication and Testing of a Prototype Fly-Away Satellite Triangulation System; Current and Light Storage Effects in Lithium and Sodium Doped Crystals of ZnO; Electrical and Magnetic Properties of Single Crystals of Rare Earth Tungsten Bronzes and Uranium Tungsten Bronzes; Dielectric Resonators; Solid State Display Techniques; Using the Electronic Computer to Define and Implement Policy; Study of Job Preferences of Government and Non-Government Personnel; Maximizing Protection from EOQ Safety Levels; Correlation of Analytical and Empirical Techniques for Designing Supersonic and Hypersonic Decelerators; Blast Wave Effects on the Pitching of Blunt Cones; Development of a Unique Mobile Integrated Support System for Tactical Electronics; Machines that Communicate and Designers Who Don't; Photographic Display Systems - Typical USAF Applications; Analysis of Digital Communication Systems on Tropospheric Scatter.

AD-641 923 **Field 5A**
CFSTI Prices: HC$7.00 MF$1.50
Air Force Systems Command, Washington, D. C.
PROCEEDINGS OF THE ANNUAL AIR FORCE SCIENCE AND ENGINEERING SYMPOSIUM (13th), 27-28-29 SEPTEMBER 1966, ARNOLD ENGINEERING DEVELOPMENT CENTER, ARNOLD AIR FORCE STATION, TENNESSEE. VOLUME III. UNCLASSIFIED, UNCONTROLLED DISTRIBUTION VOLUME OF UNPRESENTED PAPERS.
29 Sep 66, 319p
See also AD-641 921, AD-641 922.

Descriptors: (*Symposia, *Air force research), Scientific research, Engineering, Magnets, Telemeter systems, Attitude control systems, Altimeters, Space biology, Clear air turbulence.

Contents: Optimum Magnets for MHD Generators; Automation in the New Eastern Test Range Central Telemetry Station (TEL-IV); Control Logic for Attitude Control of a Space Vehicle; USAF Improved Altimetry Systems; Thunderstorm Lightning; Bioastronautics Laboratory Research Tool; Gemini Launch Vehicle Pilot Safety Program; Simulation of Low Altitude Clear Air Turbulence for Automatic Flight Control Design; Evaluation of the Accelerocardiograph as an Instrument for Measurement of Physiological Parameters; Electromagnetic Pulse (EMP) Generation and Measurement.

AD-641 955 **Field 5A, 5I**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE WAGE SURVEY AS A MANAGERIAL TOOL,
by William A. Groenekamp. Nov 66, 13p P-3474

Descriptors: (*Wages, *Management engineering), Decision making, Job analysis, Computers, Reasoning.

Wage surveys can be an important tool if used properly. The successful application depends on many factors -- the most important being the use of managerial judgment. Computers have made it possible to obtain more up-to-date data, and to obtain it quickly. But survey users must be wary lest they come to rely too heavily on the computer. More care than ever is now needed to insure intelligent use of available data. (Author)

N66-33171 **Field 5A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
MANAGEMENT OF SCIENCE.
by B. C. Meyers II. 1964, 13p NASA-TM-X-54866
Presented At The Intern. Management Conf., Sam, N. Y., 16 Oct. 1964

Descriptors: *Nasa program, *Program management, Aerospace, Approach, Concept, Engineering, Management, Philosophy, Program, Research, Science, Technology.

For abstract, see STAR 04 19.

N66-38746 **Field 5A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A MANAGEMENT PLAN FOR SYSTEMS ASSURANCE DURING PHASES A, B, C, AND D.
by P. T. Farish. 14 Sep 66, 40p NASA-TM-X-53516

Descriptors: *Management planning, *Nasa program, Assurance, Engineering, Function, Human, Maintainability, Organization, Quality, Relation, Reliability, Safety, System, Working.

For abstract, see STAR 04 23.

PB-173 476 **Field 5A**
CFSTI Prices: HC$1.60 MF$0.50
Yale Univ., New Haven, Conn.
THE SCIENTIFIC FOUNDATIONS OF SCIENCE POLICY,
by Derek J. De Solla Price. 1965, 16p
Pub. in Nature v206 n4981 p233-8 Apr 17 1965.
Rept. on NSF Scientific Documentation Project.

Descriptors: (*Scientific research, *Research program administration).

AD-252 910 **See Field 9B**

AD-641 357 **See Field 12B**

AD-641 499 **See Field 12B**

5B. DOCUMENTATION AND INFORMATION TECHNOLOGY

AD-446 610 **Field 5B**
CFSTI Price: HC$2.00
System Development Corp., Santa Monica, Calif.
MACHINE PROCESSING IN A SPECIAL LIBRARY. VOL I. A SURVEY OF CASE STUDIES,
by Louise Schultz. 15 Jul 64, 48p SP-1679-001-00

Descriptors: (*Libraries, Information retrieval), (*Information retrieval, Libraries), Data processing systems, Catalogs.

Identifiers: IBM 1401, IBM 7090, KWIC, Satire, Special libraries.

The range of application of EAM and EDP techniques to the technical operations and service mission of the special library is typified by several summaries. A table of principal features of each system studied aids comparison of the applications. Source literature on each system is cited. (Author)

AD-641 326 **Field 5B, 14E, 15D**
CFSTI Prices: HC$4.00 MF$0.75
IBM Federal Systems Div., Gaithersburg, Md.
ORGANIZATION AND PRESENTATION OF IMAGE INTERPRETER REFERENCE AND AUXILIARY INFORMATION.
Technical research note,
by Arthur Nelson, Kenneth McClure, John Polgreen, and Robert Sadacca. Jun 66, 119p
Contract DA-49-092-ARO-7
Proj. DA-2J620901A721
APRO-TRN-173

Descriptors: (*Photointerpretation, *Data processing systems), (*Documentation, Photographic intelligence), Information retrieval, Navigation, Display systems, Automation.

The model, the task analysis results, and a survey of equipment for reference displays were all used to evaluate design alternatives for indexing, storage forms, storage media, and displays, as well as requirements and displays for auxiliary data. Three modes of TIIF operation-manual, semi-automated, and automated-were considered. Reference storage forms, media, and displays should be selected in the context of a manual or automated TIIF system. For a manual system, references should be in their original form and stored in file cabinets. For an automated system, references should be standardized according to interpreter needs and controlled by a computer processing unit. Reference indexes should be designed for each type of reference, utilizing existing indexes as far as possible. Collection and processing of auxiliary information should be automated for ease of subsequent processing. The code matrix block should be used whenever possible. The displays of auxiliary information should relate to whether the system is manual or automated. For the manual system, auxiliary displays should be viewed in hard copy or in the original format. For the automated system, displays, if needed, should be under computer control. Additional information for a code matrix block should include aircraft stabilization data. (Author)

AD-641 564 **Field 5B, 9B, 20L**
CFSTI Prices: HC$3.00 MF$0.75
Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia.
AUTOMATIC INTRODUCTION OF INFORMATION INTO A REMOTE-ACCESS SYSTEM: A PHYSICS LIBRARY CATALOG.
Technical rept.,
by Philippe J. Gabrini. 1 Nov 66, 79p Rept. no. 67-09
Contract Nonr-551 (40)

Descriptors: (*Documentation, *Physics), (*Data processing systems, Documentation), Programming (Computers), Information retrieval.

Identifiers: List processing, Remote access system, File structures.

The objective of this work is twofold: First, to develop generalized programs and procedures for accepting large volume information and incorporating it automatically into the files of the Multilist system; second, to demonstrate by a specific example the special advantages of use of the query language, file directories and file Multilist structure. The example is an automated library catalog which has been created in this system by introducing into the mass memory a large collection of Physics articles already used for a similar purpose by the M.I.T. Technical Information Project; however, a program had to be written to change their format. A second, more general program was written which enters items into the Multilist system. (Author)

N66-33416 **Field 5B**
CFSTI Prices HC$1.00 MF$0.50
Kansas Univ., Lawrence.
ASSOCIATIVE RETRIEVAL BY DYNAMIC TRANSFORMS.
by W. O. Clark. 1964, 18p NASA-CR-59810
Grant NSG-298
Presented At The Southeastern Regional Meeting Of Assoc. For Computing Machinery And Southeastern Simulation Council, Atlanta, 16 Oct. 1964

Descriptors: *Digital computer, *Information processing, *Memory, Address, Association, Binary, Boolean algebra, Calculation, Comparison, Computer, Cycle, Digital, Dynamic, Information, Method, Processing, Search, Technique, Transform.

For abstract, see STAR 04 19.

N66-34085 **Field 5B**
CFSTI Prices HC$3.25 MF$1.00
Documentation, Inc., College Park, Md. Nasa Scientific And Technical Information
GUIDE TO THE PROCESSING, STORAGE, AND RETRIEVAL OF BIBLIOGRAPHIC INFORMATION AT THE NASA SCIENTIFIC AND TECHNICAL INFORMATION FACILITY.
by W. T. Brandhorst, and P. F. Eckert. Jun 66, 154p NASA-CR-62033
Contract NASW-1315

Descriptors: *Data processing, *Handbook, *Information retrieval, *Nasa program, Abstract, Bibliography, Computer, Data, Document, Documentation, Index, Information, Literature, Processing, Program, Publication, Retrieval, Science, Search, Storage, Subject, Technology.

For abstract, see STAR 04 19.

N66-37803 **Field 5B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INFORMATION SCIENCE.
by V. Slamecka. 15 Aug 66, 18p NASA-TM-X-53503
Presented At The Space Sci. Seminar, Nasa. Marshall Space Flight Center, 19 May 1966

Descriptors: *Data processing, *Information theory, Communication, Control, Generation, Growth, Information, Method, Phenomenology, Process, Science.

For abstract, see STAR 04 23.

N66-38723 **Field 5B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
A SELECTIVE BIBLIOGRAPHY, 1949 - 1965.
by V. A. Rapetti. Jul 66, 28p NASA-TM-X-57967

Descriptors: *Bibliography, *Launching facility, *National aeronautics and space act, Development, Expansion, Facility, History, Launching, Nasa program, Organization, Site, Space flight.

For abstract, see STAR 04 23.

N66-38726 **Field 5B**
CFSTI Prices HC$1.00 MF$0.50
Army Missile Command, Huntsville, Ala. Redstone Scientific Information Center.
UNCLASSIFIED INFORMATION LIST, 12-16 SEPTEMBER 1966.
1966, 24p NASA-CR-78540, RSIC-U-66-35
Sponsored In Part By Nasa

Descriptors: *Chemistry, *Mathematics, *Physics, *Science (gen), Aeronautics, Astronomy, Atmospheric, Biology, Communications, Documentation, Electronics, Engineering, Information, List, Material, Missile, Navigation, Oceanography, Propulsion, Space.

For abstract, see STAR 04 23.

PB-173 461 **Field 5B, 20H**
CFSTI Prices: HC$1.10 MF$0.50
American Inst. of Physics, New York.
INDEXING PHYSICS RESEARCH PAPERS. COMMENTARY.
13 Sep 63, 6p AIP/DRP-63:1-Suppl
Rept. on NSF Scientific Documentation Project.

Descriptors: (*Physics, *Subject indexing), Scientific research, Nuclear physics.

The commentary is on the Critique by Dr. Katherine Way of AIP/DRP 63-1. The first part is a detailed discussion on a point-by-point basis and the second part is made up of general observations. (Author)

PB-173 477 **Field 5B, 9B**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
INTERACTIVE DISPLAYS FOR DOCUMENT RETRIEVAL,
by H. Borko, and H. P. Burnaugh. 4 Aug 66, 26p SP-2557

Descriptors: (*Information retrieval, *Display systems), (*Data storage systems, Display systemx), Automatic, Computers, Feedback, Bibliographies.

Identifiers: BOLD retrieval system.

Interactive computer systems establish a dialog between the man and the machine. By means of displays, the user receives immediate feedback of the results of his actions, and he is able to modify his decisions in order to obtain a system response that is most relevant to his needs. BOLD (Bibliographic On-Line Display) is an example of a highly automated interactive document storage and retrieval system that is in operation. It enables the user to browse through the data base by subject categories or search for specific documents. The response is rapid and the results are satisfying. (Author)

AD-422-112 **See Field 9B**

AD-641 745 **See Field 9B**

AD-641 851 **See Field 5A**

N66-37801 **See Field 22B**

PB-173 474 **See Field 6E**

5C. ECONOMICS

AD-641 822 **Field 5C**
CFSTI Prices: HC$2.00 MF$0.50
Center for Naval Analyses, Washington, D. C. Systems Evaluation Group.
MORE ON MEASURES OF MARKET STRUCTURE.
by B. A. Kemp. 21 Sep 66, 42p SEG Research Contrib-6
Contract Nonr-3732 (00)

Descriptors: (*Commerce, Statistical analysis), (*Industries, Commerce), Economics, Distribution.

Identifiers: Market research.

An index of market structure called the Lagged Rank index is developed. It measures the influence that firms are likely to have over the market. It takes account of the influence that is likely to result either because the market has few firms or because the firms are of unequal size. This technique is directly related to the Gini coefficient. It eliminates some of the shortcomings of each of the existing measures of 'concentration' - the Top-4 ratio, the Herfindahl index and the Gini coefficient - while retaining their primary advantages. The fact that any one technique for measuring the structure of the market is conceptually better than another is not sufficient. Any good index must distinguish among 'different' market structures which cause variations in the patterns of rivalry among the firms and in the resulting socio-economic performance. To determine if any of the indexes disguise important differences in market structure, a procedure is developed which makes it possible to determine all of the market structures which will result in the same value of the index. By comparing these market structures the analyst can determine if they are in fact similar or if there are meaningful differences in structure which are likely to affect the results. Then by varying the values of the indexes while keeping the number of firms constant and by varying the number of firms for given values of the index, it is possible to determine how these variations affect the ability of the indexes to distinguish relevant differences in market structure. (Author)

AD-641 855 **Field 5C, 15C, 5D**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
AN ECONOMIC THEORY OF ALLIANCES,
by Mancur Olson, Jr., and Richard Zeckhauser.
Oct 66, 47p RM-4297-ISA
Contract SD-300

Descriptors: (*Military organizations, *Economics), Armed forces budgets, Armed forces (Foreign), Theory.

Identifiers: International alliances.

The report presents a new theoretical model of military alliances and other international organizations. The assumptions basic to the model are that nations act in their own best interests and that there is a 'public goods' aspect to all joint undertakings. The main conclusions drawn from the analysis are that (1) a less than optimal amount of resources will be devoted to an alliance or other international organization; (2) the burden of an alliance will be borne in a disproportional way, the larger members paying more than their proportional share. Empirical data from NATO and the United Nations are presented in support of these conclusions. (Author)

AD-641 905 **Field 5C, 5D**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE PARTY OF BIG BUSINESS AND THE PARTY OF THE PEOPLE: A NOTE ON TRENDS IN THE CORPORATE PROFIT SHARE,
by Sidney G. Winter, Jr. Oct 66, 13p P-3471

Descriptors: (*Economics, *Political science), United States Government, Commerce, Money, Analysis of variance.

Identifiers: Profit sharing.

A commentary is given on the 1962 'Annual Report of the Council of Economic Advisers.'

N66-33134 **Field 5C**
CFSTI Prices HC$1.00 MF$0.50
India. Dept. Of Atomic Energy, Bombay.
SCIENCE AND THE PROBLEMS OF DEVELOPMENT.
by H. J. Bhabha. 1966, 14p
Presented At Intern. Council Of Sci. Unions, 7 Jan. 1966

Descriptors: *India, *Science (gen), Atom, Development, Discussion, Energy, Growth, Metal, Plant, Reactor, Technology, University, Uranium.

For abstract, see STAR 04 19.

N66-34037 **Field 5C**
CFSTI Prices HC$2.00 MF$0.50
Bundesministerium Fur Verkehr, Bonn (West Germany).
STATUS AND SPECIAL PROBLEMS OF THE GERMAN CIVIL AVIATION. SPECIAL PROBLEMS OF THE INTERNATIONAL ECONOMIC COOPERATION IN THE AVIATION FIELD IN PARTICULAR RESPECT TO DEVELOPING NATIONS.
Stand Und Besondere Probleme Der Deutschen Zivilluftfahrt. Besondere Probleme Der Internationalen Wirtschaftlichen Zusammenarbeit Auf Dem Gebiet Der Luftfahrt Insbesondere Mit Entwicklungslaendern
by G. Fritz, and H.-C. Seebohm. 25 Jun 64, 50p REPT.-11
In German

Descriptors: *Civil aviation, *Germany, *International cooperation, Agriculture, Airport, Aviation, Civil, Cooperation, Development, Industry, International, Nation, Participation, Planning, Transportation.

For abstract, see STAR 04 19.

PB-173 460 **Field 5C**
CFSTI Prices: HC$2.00 MF$0.50
Area Redevelopment Administration, Washington, D. C.
THE COMMUNITY AND ECONOMIC DEVELOPMENT,
by William L. Batt, Jr. May 64, 41p

Descriptors: (*United States, *Economics), Urban planning, United States Government, Employment, Commerce, Money, Industries, Personnel management, Natural resources, Transportation.

Identifiers: Area redevelopment.

Contents: The need for local economic development; The high cost of abandonment; A new approach; Getting started; The importance of a plan; The money problem; Attracting new industries; Developing local industries; The importance of distributive businesses; Getting the visitor dollar; Exploiting natural resources; Education, training, and manpower needs; Getting the right community facilities; Roads, railways and airports; Urban renewal; The need for research; Where to get help; (ARA services, Other federal programs, State services, Private sources of help, Local responsibility); Suggested reading; State agencies concerned with economic development.

PB-173 465 **Field 5C, 5D**
CFSTI Prices: HC$6.00 MF$1.25
International Customs Tariffs Bureau, Brussels (Belgium).
CENTRAL AFRICAN CUSTOMS AND ECONOMIC UNION (C.A.C.E.U.).
1st ed., Year 1966-1967.
Aug 66, 239p
Pub as International Customs Journal Bull-66.

Descriptors: (*Subsaharan Africa, Commerce), Economics, Law.

Identifiers: Tariffs.

Contents: Treaty creating a Central African Customs and Economic Union, and other acts; Act N (o) 7/65-UDEAC-36 establishing the customs tariff of the Central African Customs and Economic Union; Act N (o) 10/65-UDEAC-29 stipulating the list of customhouses common to the Union; Schedule of import duties and taxes.

AD-641 506 **See Field 15E**

AD-641 507 **See Field 15E**

AD-641 508 **See Field 15E**

AD-641 890 **See Field 15E**

AD-641 925 **See Field 13B**

5D. HISTORY, LAW, AND POLITICAL SCIENCE

AD-641 665 **Field 5D**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
TAIWAN IN 1966,
by Mel Gurtov. Oct 66, 12p P-3469

Descriptors: (*Taiwan, Political science), Government (Foreign), Leadership, Economics, Industrial production, Social sciences.

The pattern of conservatism and liberalization that has characterized Taiwan since 1960 continued in 1966. In domestic politics and foreign relations, Chiang Kai-shek kept the nation locked in its course of retaining absolute Kuomintang control, preparing for an imminent return to the mainland, and acquiring support for the ROC as the true China. This political rigidity was in contrast to a

number of ambitious economic and social undertakings that pointed up a firm commitment within the leadership to Taiwan's development into a modern, progressive state. (Author)

AD-641 855 See Field 5C

AD-641 905 See Field 5C

AD-641 956 See Field 15G

PB-173 465 See Field 5C

5E. HUMAN FACTORS ENGINEERING

AD-109 235 Field 5E
CFSTI Price: HC$1.10
Rochester Univ., N. Y.
THE EFFECTS OF INERTIA ON THE ACCURACY OF KNOB SETTINGS,
by B. Weiss, and R. F. Green. Jan 53, 7p
Contract N6onr-241 (06)
SPECDEVCEN-241-6-9

Descriptors: (*Control knobs, Inertia), (*Human engineering, Control knobs), Performance (Human), Errors, Design, Display systems.

Range finders, radar sets, radios, and many other pieces of military equipment require adjustments to be made with knobs. Whenever there are knob settings to be made there is also the problem of the dead zone. This is a zone of uncertainty which surrounds the correct setting. To find the correct setting we usually find the limits of the dead zone and then try to make a setting halfway in between. Where we cannot watch the knob, we use information from our muscles and joints to perform this operation of bracketing and bisection. The research attempted to find out what effect inertia, or fly-wheel effect, has on the accuracy of this kind of knob adjustment. An apparatus was used which varied both the size of the dead zone and the amount of inertia. The boundaries of the dead zone were indicated by the flashing on of a neon lamp when the subject turned past these boundaries. The subject was required to make five adjustments at each of four different dead zone angles, using one inertia value throughout. Seven values of inertia were used and four dead zone angles: 40, 80, 120, and 160 degrees. The subject could not see the knob during the experiment. Error was calculated as the difference in degrees between the setting the subject made and the setting he was attempting to make.

AD-109 236 Field 5E
CFSTI Price: HC$1.10
Rochester Univ., N. Y.
THE EFFECTS OF FRICTION ON THE ACCURACY OF KNOB SETTINGS,
by P. Swartz, R. F. Green, B. Weiss, H. Zimiles, and S. D. S. Spragg. 1 Aug 55, 10p
Contract N6onr-241 (06)
Proj. SPECDEVCEN-20-M-1d
SPECDEVCEN-241-6-14

Descriptors: (*Control knobs, Friction), Human engineering, Performance (Human), Errors, Statistical analysis, Design.

AD-109 237 Field 5E
CFSTI Price: HC$1.10
Rochester Univ., N. Y.
ACCURACY OF SETTING CONTROL KNOBS AS FUNCTIONS OF DIRECTIONS OF FINAL MOVEMENT AND NUMBER OF SETTINGS,
by Russel F. Green. 1 Aug 55, 10p
Contract N6onr-241 (06)
Proj. 20-m-1d
SPECDEVCEN-241-6-15

Descriptors: (*Control knobs, *Human engineering), Performance (Human), Display systems, Feedback, Training, Design, Statistical analysis.

It has been thought that when an operator is making a knob setting for such situations as adjusting radio equipment or operating a range finder which require attempts to bisect a zone of uncertainty that it would not matter whether the final setting movement was clockwise (right) or counterclockwise (left), assuming the knob is in the frontal plane. It was also expected that if an operator made several settings they would vary at random around some mean value. These problems were investigated in this research. Results: (1) Under most conditions, settings made to the left were more accurate than settings made to the right. (2) For the number of trials used in this study (8-10), successive bisections of the same angle resulted in progressively poorer mean performance -- except when the setting was made to the left through a 120 deg angle. (3) Accuracy of settings was found to vary according to how three factors -- angle size, direction of final setting movement, and number of trials -- were combined. (Author)

AD-109 238 Field 5E
CFSTI Price: HC$1.60
Rochester Univ., N. Y.
THE EFFECT OF INTERMITTENT COURSE ILLUMINATION OF DIFFERING FREQUENCIES ON TRACKING PERFORMANCE,
by Milton S. Katz, and S. D. S. Spragg. 1 Aug 65, 11p
Contract N6onr-241 (06)
Proj. SPECDEVCEN-20-M-1d
SPECDEVCEN-241-6-16

Descriptors: (*Tracking, Performance (Human)), (*Display systems, Design), Errors, Illumination, Sensory perception, Statistical analysis, Human engineering.

The report is concerned with the way in which a human operator performs when he is functioning as a servo link in tracking and similar tasks. One basic problem in tracking performance is whether the operator's responses are essentially intermittent and ballistic in nature (like an intermittent correction servo) with a maximum correction rate of 2 per second as some experimenters have asserted, or whether they are continuous, a stimulus signal producing a response which is integrated with other responses under way at that time. An experiment was performed which attempted to throw light on this problem by means of a tracking task in which target course information was presented in discrete glimpses at several rates, ranging from 0.5 to 4.0 flashes per second, and also with steady illumination. Average tracking error was measured. (Author)

AD-456 363 Field 5E
CFSTI Price: HC$7.60
Army Research Office of the Chief Research and Development, Washington, D. C.
TENTH ANNUAL ARMY HUMAN FACTORS RESEARCH AND DEVELOPMENT CONFERENCE, 6-8 OCTOBER 1964, U. S. ARMY AVIATION CENTER, FORT RUCKER, ALABAMA.
Oct 64, 461p

Descriptors: (*Human engineering, Army research), (*Symposia, Human engineering), Aviation accidents, Aviation safety, Tactical warfare, Mobile, Maneuverability, Army operations, Helicopters, Military training, Military personnel, Unconventional warfare, Counterinsurgency, Communication systems, Data storage systems, Data transmission systems, Display systems, Weapon systems, Military intelligence, Photointerpretation, Test methods, Skin, Electricity, Stimulation, Surface targets, Target recognition, Aerial reconnaissance, Low altitude, Visual inspection, Navigation, Anthropometry, Flight instruments, Medical research, Army aircraft.

Identifiers: H-1 aircraft, Nap-of-the-earth, Photointerpretation keys.

Tenth annual Army human factors research and development conference.

AD-50 619 Field 5E, 5J
CFSTI Price: HC$2.60
Johns Hopkins Univ., Baltimore, Md.
SOME DESIGN FACTORS AFFECTING THE SPEED OF IDENTIFICATION OF RANGE RINGS ON POLAR COORDINATE DISPLAYS,
by W. R. Garner, Dorothy C. Saltzman, and I. J. Saltzman. 10 Aug 49, 27p
Contract N5ori-166 (01)
Proj. 20-F-1
SPECDEVCEN-166-I-95

Descriptors: (*Display systems, Design), (*Human engineering, Display systems), Identification, Stress (Psychology), Motivation.

The results of the experiment lead to the following conclusions: Range rings nearest the center of the display are identified most rapidly and outermost range rings are identified the next fastest. Range rings just beyond the middle of the display are identified the least rapidly. The relationship between speed of identification and distance of the rings from the center is accounted for in terms of a search factor -- observers usually start looking from the center of the display out -- and in terms of a confusion factor, which is most severe at the middle ranges. Identification time increases with an increase in the total number of rings. Part of this increase may be due to the increased number of responses which are necessary with greater numbers of rings. When the area of search for a target is restricted to a single quadrant, identification time is decreased; and along with this overall decrease, there is a flattening of the curve which relates identification time to the distance of the ring from the center. Patterning of four-ring designs does not increase the speed of identifying range rings. Patterning of eight-ring designs increases the speed of identifying range rings. The most effective pattern is one which divides the eight rings into the two groups of four. (Author)

AD-51 494 Field 5E
CFSTI Price: HC$1.10
Rochester Univ., N. Y.
TRANSFER EFFECTS IN FOLLOWING TRACKING RESULTING FROM REVERSAL OF THE DISPLAY-CONTROL RELATIONSHIP ON ALTERNATE BLOCKS OF TRIALS,
by B. G. Andreas, R. F. Green, and S. D. S. Spragg. 21 Sep 63, 10p
Contract N6onr-241 (06)
Proj. 20-M-1d
SPECDEVCEN-241-6-10

Descriptors: (*Transfer of training, *Motor reactions), (*Tracking, Transfer of training), Display systems, Learning, Human engineering, Design, Control systems.

A study was made to determine the conditions which will minimize the losses in performance which occur when an operator switches back and forth between two pieces of equipment which differ in control-display movement relationships. Results: (1) Performance with the 'natural' display-control relationship is not adversely affected by interspersed trials with the 'unnatural' condition. (2) Learning of tracking skill attained with the 'unnatural' display-control relationship was less when practice under the 'natural' condition was given first or interspersed. (3) The order in which the two opposite tracking tasks are performed has little effect on performance. (4) Upon changing from one task to the other, an initial facilitating effect may sometimes appear, but it does not persist. It is recommended that the 'natural' display-control relationship be used wherever possible, because it is resistant to interference effects. For training purposes, this experiment indicates that there would be no reduction in interference effects by alternating tracking practice under the two conditions. (Author)

AD-641 450 **Field 5E, 17I**
Not available from CFSTI.
New York Univ., N. Y.
MODIFICATION OF THE CONTROLS OF THE IP-48/APA-56 RANGE-AZIMUTH INDICATOR.
Memorandum rept.,
by Joseph G. Adiletta, and A. Harold Abrams.
Jul 50, 9p
Contract N6onr-279 (03)
Projs. NR-784-006, SPECDEVCEN-20-F-4
SPECDEVCEN-279-3-1
Availability: Microfiche only after original copies exhausted.

Descriptors: (*Control panels, Radar equipment), (*Display systems, Human engineering), Control systems.

Identifiers: IP-48/APA-56.

The report presents the results of a study to determine how well the controls of the IP-48/APA-56 Range Azimuth Indicator Console conformed to accepted human engineering principles.

AD-641 658 **Field 5E, 5H, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
STUDIES IN DISPLAY SYMBOL LEGIBILITY. PART XIV. THE LEGIBILITY OF MILITARY MAP SYMBOLS ON TELEVISION,
by M. Marsetta, and D. Shurtleff. Sep 66, 48p MTR-264
Contract AF 19 (628)-5165
Proj. AF-7030
ESD-TR-66-315
See also AD-639 750.

Descriptors: (*Television display systems, *Maps), Visibility, Human engineering, Armed forces operations.

Identifiers: Legibility.

The speed and accuracy with which five subjects identified military map symbols were determined with five different resolutions in lines per symbol height on a television monitor in three experiments. The first two experiments indicated that the minimum acceptable resolution is approximately 17 lines even after considerable practice. The third experiment indicated that a slightly lower resolution is permissible only with an optimum contrast of detail and a carefully selected and maintained television system. Recommendations are made for field installations. (Author)

AD-641 926 **Field 5E, 5H, 17B**
CFSTI Prices: HC$3.00 MF$0.75
Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART XV. RELATIVE LEGIBILITY OF LEROY AND TELETYPEWRITER SYMBOLS,
by G. L. Bell. Sep 66, 80p MTR-265-Pt-15
Contract AF 19 (628)-5165
Proj. AF-7030
ESD-TR-66-316-Pt-15
See also AD-638 664.

Descriptors: (*Television display systems, Visibility), (*Meteorological parameters, Television display systems), Reading, Teletype systems, Visual signals, Reports, Human engineering.

Identifiers: Legibility, Leroy font.

The first two studies are reported from a planned series of studies to obtain legibility data on teletyped hourly sequence weather reports. In the first study, subjects were asked to identify symbols, shown singly in a random order with the symbols occurring with equal frequencies. The two teletype fonts, Murray and Long Gothic, were compared with a standard Leroy font. The second study used the teletype fonts only, and the subjects identified symbols shown with symbol frequencies similar to those in typical hourly sequence reports. For these experimental conditions, the teletype fonts were not as legible as the standard Leroy font although the symbol frequencies found in typical hourly sequence reports improved the subjects' reading performances. (Author)

AD-92 507 **Field 5E**
CFSTI Price: HC$2.60
Rochester Univ., N. Y. Dept. of Psychology.
BUILDING 'FEEL' INTO CONTROLS: THE EFFECT ON MOTOR PERFORMANCE OF DIFFERENT KINDS AND AMOUNTS OF FEEDBACK,
by B. Weiss. 14 Oct 53, 23p
Contract N6onr-241 (06)
Proj. SPECDEVCEN-20-M-1d
SPECDEVCEN-241-6-11

Descriptors: (*Control systems, Human engineering), Motor reactions, Feedback, Performance (Human), Proprioception.

Some of the booster systems that are used in aircraft completely eliminate or distort the resistance in the control that is found in older-type aircraft. This resistance, or control 'feel', is sometimes held to be useful to the pilot because it may provide information that helps him to make more accurate adjustments of the control. This study reports effects of pressure changes and amount of movement on the operator's ability to control a display by means of an aircraft stick control. It was found that (1) Performance improves as the range of distance (e.g. control stick range) available to the operator increases. (2) Pressure feedback has no apparent effect on performance in a task which, like this one, requires the operator to predict what a certain setting of the control will do to what is being controlled. It is recommended that the control designer try to provide as much distance variation as possible, since this is the crucial dimension of the force-displacement relationship, and since relative error decreases with distance.

N66-33138 **Field 5E, 6S**
CFSTI Prices HC$4.00 MF$1.00
Royal Swedish Academy Of Sciences, Stockholm.
VIBRATIONS OF TRACTOR DRIVER.
by S. Bjerninger. 1966, 127p
Its Acta Polytechnica Scandinavica Mech. Eng. Ser. No. 23

Descriptors: *Human engineering, *Seat, *Vibration testing, Characteristics, Damping, Design, Driver, Engineering, Ground, Human, Man, Road, Speed, Spring, Strain, Suspension, Testing, Tractor, Vibration.

For abstract, see STAR 04 19.

N66-33198 **Field 5E**
CFSTI Prices HC$5.00 MF$1.00
General Dynamics/convair, San Diego, Calif.
FEASIBILITY STUDY OF FREEZE-OUT TECHNIQUES FOR CONTAMINANT CONTROL WITHIN MANNED SPACECRAFT ATMOSPHERES FINAL TECHNICAL REPORT, 11 OCT. 1965 - 11 APR. 1966.
by J. C. Ballinger, G. L. Drake, E. J. Russ, W. J. Sevier, and D. W. Vorbeck. 27 May 66, 151p NASA-CR-66150
Contract NAS1-5625
Its Rept.-64-26243

Descriptors: *Atmospheric impurity, *Freezing, *Manned spacecraft, *Spacecraft contamination, Carbon, Contamination, Control, Dioxide, Equilibrium, Freezeout, Gaseous, Impurity, Life, Loading, Manned, Performance, Physical, Property, Radiator, Rate, Removal, Spacecraft, Support, Technique, Temperature, Trace, Transport, Water.

For abstract, see STAR 04 19.

N66-33717 **Field 5E**
CFSTI Prices HC$2.50 MF$0.50
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
AN ENGINEERING STUDY AND PRELIMINARY DESIGN OF A ONE MAN PROPULSION DEVICE FOR LUNAR AND FREE-SPACE ENVIRONMENTS MID-POINT ORAL STATUS REPORT.
20 Jan 64, 57p NASA-CR-65441
Contract NAS9-2065

Descriptors: *Free space, *Lunar environment, *Personnel propulsion system, Control, Device, Environment, Free, Gravity, Locomotion, Lunar, Man, Model, Navigation, One, Personnel, Propulsion, Space, Surface, System.

For abstract, see STAR 04 19.

PB-173 174 **Field 5E, 5J**
CFSTI Prices: HC$1.60 MF$0.50
Laboratory of Aviation Psychology, Ohio State Univ., Research Foundation, Columbus.
AN INITIAL EVALUATION OF A VIBROTACTILE DISPLAY IN COMPLEX CONTROL TASKS,
by W. C. Howell, and G. E. Briggs. 31 Oct 59, 20p
Technical rept. TR-813-5
Contract AF 33 (616)-5524
Proj. AF-9 (610-6190)
Task 50786
AD-230 472

Descriptors: (*Display systems, *Human engineering), Touch.

Three experiments were completed which explored the accuracy human operators can achieve in both simple and complex control tasks when input and output information are displayed via the tactual sense modality. In the first two studies it was demonstrated that a vibrotactile display can be as effective as a visual display provided the system input is in the ultra low frequency range (0 to 5 cpm). Since humans normally have had little experience with meaningful vibrotactile stimulation, it is necessary to provide the operator with training in control tasks which involve such displays. It is conceivable that with sufficient training the human could adequately control systems with inputs involving frequencies higher than 5 cpm. The present research does not enable one to predict how much training would be required, but it is suggested that the amount would be considerable, especially for higher frequency inputs.

AD-641 448 **See Field 15C**

AD-641 455 **See Field 15C**

AD-641 600 **See Field 5I**

5F. HUMANITIES

N66-33422 **Field 5F**
CFSTI Prices HC$1.00 MF$0.50
Massachusetts Inst. Of Tech., Cambridge. Research Lab. Of Electronics.
WHAT'S IN THE BRAIN THAT INK MAY CHARACTER (QUES).
by W. S. Mc culloch. 1964, 14p NASA-CR-59932
Grant NSG-496, Contract DA-36-039-AMC-03200/E/
Presented At The Intern. Congr. For Logic, Methodology And Phil. Of Sci., Jerusalem, 28 Aug. 1964

Descriptors: *Mathematical model, *Neurophysiology, *Physiological phenomenon, Calculus, Failure, Hypothesis, Logic, Mathematics, Model, Multiple, Neuron, Phenomenon, Physiology, Value.

For abstract, see STAR 04 19.

5G. LINGUISTICS

PB-173 514 **Field 5G, 5J, 9B**
CFSTI Prices: HC$1.60 MF$0.50
Michigan Univ., Ann Arbor. Mental Health Research Inst.

COMPUTERS IN BEHAVIORAL SCIENCE,
by Leonard Uhr. 1 Nov 63, 13p
Grant PHS-M-5254
Rept. on NSF Scientific Documentation Proj. Reprinted from Behavioral Science v9 n3 p258-70 Jul 1964.

Descriptors: (*Computational linguistics, Learning), (*Learning, Pattern recognition), Digital computers, Programming (Computers), Behavior, Reaction (Psychology).

These programs can be thought of as compilers whose job it is to write memory graphs as a function of sequences of input-output statements that are examples of what the graph being compiled ought to do. Thus the graph is specified by the environment, but only through examples, and only in small pieces. The memory graph is equivalent to a compiled program, and must, therefore, not merely passively represent what has been learned, but also be in a form for active use. It must further be capable of unlearning, so that it can successfully cope with changing environments.

AD-478 089 See Field 14E

AD-641 671 See Field 6D

5H. MAN-MACHINE RELATIONS

AD-50 739 **Field 5H**
CFSTI Price: HC$1.10
Psychological Lab., Johns Hopkins Univ., Baltimore, Md.
PROBLEMS OF SYSTEMS COORDINATION AND PLANS FOR DEALING WITH THEM,
by C. T. Morgan. 20 Dec 50, 10p
SPECDEVCEN-166-I-129

Descriptors: (*Man-machine systems, Systems engineering), Research program administration, Human engineering, Applied psychology, Design.

Two general types of problems are discussed: (a) man-machine problems at the level of the operator -- operator's problems, and (b) problems of designs of systems of operators and machines -- interoperator problems. Operator problems include basic research, design consulting, design appraisals, and field evaluations. Interoperator problems include basic research, systems tests, field analysis. It is recommended that six kinds of groups should be constituted to work on these various problems: (1) Basic Research Groups, (2) Consulting Groups, (3) Coordination Groups, (4) Operational Evaluation Group, (5) Systems Coordination Facility, (6) and a Social Systems Group.

N66-32800 **Field 5H**
CFSTI Prices HC$3.75 MF$1.25
Ling-temco-vought, Inc., Dallas, Tex. Astronautics Div.
REMOTE MAN-MACHINE CONTROL SYSTEM EVALUATION FINAL REPORT.
by A. G. Charron. Aug 64, 230p NASA-CR-76889
Contract NASW-744
Its Rept.-00.424

Descriptors: *Man-machine system, *Mars spacecraft, *Remote control, *Space exploration, *Systems analysis, Acquisition, Analysis, Automatic, Control, Cost, Data, Environment, Exploration, Information, Loop, Man-machine, Mars, Mission, Observation, Orbit, Reconnaissance, Reliability, Remote, Sensor, Space, Spacecraft, Surface, System, Weight.

For abstract, see STAR 04 19.

N66-32959 **Field 5H**
CFSTI Prices HC$3.00 MF$0.75
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
CHARACTERIZATION OF TIME-VARYING HUMAN OPERATOR DYNAMICS.
by G. A. Gagne, and W. W. Wierwille. Aug 66, 87p NASA-CR-539
Contract NAS1-4920

Descriptors: *Characteristic method, *Human reaction, *Mathematical model, *Operator performance, *Pilot performance, *Tracking study, Characterization, Coefficient, Computer, Constant, Data, Determination, Dynamics, Human, Linear, Logic, Mathematics, Method, Model, Nonlinear, Operator, Performance, Pilot, Processing, Reaction, Study, Time, Tracking, Variation.

For abstract, see STAR 04 19.

N66-33461 **Field 5H**
CFSTI Prices HC$2.00 MF$0.50
Systems Technology, Inc., Hawthorne, Calif.
PILOT DESCRIBING FUNCTION MEASUREMENTS IN A MULTILOOP TASK.
by R. Magdaleno, D. T. Mc ruer, and R. L. Stapleford. Aug 66, 36p NASA-CR-542
Contract NAS2-1868-3

Descriptors: *Control system, *Pilot performance, *Tracking, Command, Control, Damping, Display, Error, Loop, Machine, Man, Man-machine system, Model, Multiloop, Performance, Pilot, Sampling, Simulation, System, Task.

For abstract, see STAR 04 19.

N66-33981 **Field 5H**
CFSTI Prices HC$5.00 MF$0.75
Trw Systems, Redondo Beach, Calif.
HUMAN TRACKING PERFORMANCE IN UNCOUPLED AND COUPLED TWO-AXIS SYSTEMS.
by G. A. Bekey, R. E. Rose, E. P. Todosiev, and H. L. Williams. Aug 66, 90p NASA-CR-532
Contract NAS1-4419

Descriptors: *Control system, *Cross coupling, *Human performance, *Pilot performance, *Tracking study, Amplitude, Axis, Control, Coupled, Cross, Frequency, Human, Iteration, Manual, Matching, Mathematics, Model, Parameter, Performance, Phase, Pilot, Ratio, Response, System, Technique, Tracking, Two.

For abstract, see STAR 04 19.

N66-38115 **Field 5H**
CFSTI Prices HC$1.00 MF$0.50
Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-patterson Afb, Ohio.
A TECHNIQUE TO INVESTIGATE SPACE MAINTENANCE TASKS.
by D. D. Mueller, J. S. Seeman, and F. H. Smith. Apr 66, 22p NASA-CR-78433, AMRL-TR-66-32
NASA ORDER T-18811-G
Prepared Jointly With Nasa, Marshall Space Flight Center

Descriptors: *Performance decrement, *Pressurized suit, *Space maintenance, *Weightlessness, Activity, Effect, Gravity, Psychomotor, Simulation, Solenoid, Task, Tethering, Tool, Valve, Zero.

For abstract, see STAR 04 23.

N66-38413 **Field 5H**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
FIXED-BASE VISUAL-SIMULATION STUDY OF MANUALLY CONTROLLED TRANSLATION AND HOVER MANEUVERS OVER THE LUNAR SURFACE.
by G. K. Miller Jr. Oct 66, 26p NASA-TN-D-3653

Descriptors: *Landing simulation, *Lunar surface, *Maneuver, *Manual control, Approach, Attitude, Base, Control, Crater, Fixed, Hovering, Landing, Orbit, Site, Spacecraft, Study, Translation.

For abstract, see STAR 04 23.

N66-38751 **Field 5H**
CFSTI Prices HC$6.00 MF$3.00
Serendipity Associates, Los Angeles, Calif.
A STUDY OF POTENTIAL ROLES OF SUPERSONIC TRANSPORT CREWS AND SOME IMPLICATIONS FOR THE FLIGHT DECK. VOLUME II - FEASIBLE AUTOMATED AND MANUAL IMPLEMENTATION CONCEPTS FOR SST ACTIVITIES AND FUNCTIONS, FINAL REPORT.
by W. J. Ereneta, W. D. Honsberger, and H. E. Price. Oct 66, 613p NASA-CR-562
Contract NAS2-2209

Descriptors: *Aircraft instrumentation, *Flying personnel, *Ground crew, *Supersonic transport, Aircraft, Automatic, Communication, Control, Crew, Data, Engine, Flight, Ground, Instrumentation, Manual, Navigation, Operation, Performance, Personnel, Stability, Supersonic, Transport.

For abstract, see STAR 04 23.

N66-38756 **Field 5H**
CFSTI Prices HC$3.25 MF$1.25
Douglas Aircraft Co., Inc., Huntington Beach, Calif. Missile And Space Systems Div.
EXPERIMENTAL STUDY OF DYNAMIC EFFECTS OF CREW MOTION IN A MANNED ORBITAL RESEARCH LABORATORY (MORL).
by J. L. Fowler, and W. F. Fuhrmeister. Oct 66, 199p NASA-CR-66186
Contract NAS1-5937

Descriptors: *Exercise, *Locomotion, *Manned orbital research laboratory (morl), *Weightlessness simulation, Body, Console, Crew, Disturbance, Dynamic, Effect, Motion, Operation, Profile.

For abstract, see STAR 04 23.

N66-38800 **Field 5H**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Flight Research Center, Edwards, Calif.
FLIGHT TESTS OF A WIDE-ANGLE, INDIRECT OPTICAL VIEWING SYSTEM IN A HIGH- PERFORMANCE JET AIRCRAFT.
by W. H. Dana, and G. P. Layton Jr. Oct 66, 35p NASA-TN-D-3690
Contract 125-19-01-02-24

Descriptors: *F-104 aircraft, *Optics, *Visual flight, Angle, Attitude, High performance, Landing, Night, Pitch, Reference, Stereoscopy, System, Test, View, Vision, Wide.

For abstract, see STAR 04 23.

AD-641 658 See Field 5E

AD-641 926 See Field 5E

5I. PERSONNEL SELECTION, TRAINING, AND EVALUATION

AD-422 110 **Field 5I**
CFSTI Price: HC$2.60
Human Resources Research Office, George Washington Univ., Alexandria, Va.

A DESCRIPTION OF SNAP PROGRAMMING.
Research memo,
by Edgar L. Shriver, and Robert C. Trexler. May 63, 24p
Contract DA-44-188-ARO-2

Descriptors: (*Programmed instruction, Instruction manuals), Students, Transfer of training, Job analysis.

Identifiers: SNAP programming.

The purpose of the report is to describe a type of programming which has been given the name 'SNAP Programming.' It is designed as a simple way of producing programmed materials (under certain conditions) rather than as a method for producing more refined programs. The report describes the conditions for which SNAP programming was originally developed. The reader is left to determine for himself how this type of programming will work under conditions other than those for which the authors developed and applied it. Briefly the conditions for the original development and application of SNAP programming were (1) students were to learn how to troubleshoot a new radar system, (2) students had prior training and experience with similar radars, (3) programmers had varying but generally high degrees of familiarity with the course content, and (4) course material was derived from a task analysis which insured the relevance of the course content to the student's ultimate task. (Author)

AD-457 167 **Field 5I, 16D**
CFSTI Price: HC$3.00
Human Resources Research Office, George Washington Univ., Alexandria, Va.
IDENTIFICATION OF ELECTRONICS MAINTENANCE TRAINING REQUIREMENTS: DEVELOPMENT AND EVALUATION OF AN EXPERIMENTAL ORDNANCE RADAR REPAIR COURSE.
Research rept.,
by James A. McKnight, and Patrick J. Butler. Dec 64, 62p RR-15
Contract DA-44-188-ARO-2

Descriptors: (*Electronic technicians, Training), (*Radar equipment, Maintenance personnel), Ordnance, Job analysis, Performance test, Effectiveness, Military requirements, Radar tracking, Guided missile personnel, Army training.

Identifiers: Troubleshooting, Nicord.

The requirements most appropriate for ordnance electronics maintenance training and methods of analyzing electronics tasks were developed. The process included system, task, and knowledges and skills analyses, and determination of training objectives. A representative MOS, Nike Track Radar Repairman, was analyzed by these methods and the results reflected in a 22-week experimental course; more emphasis was placed on practical maintenance procedures and certain technical aspects, and less on circuit operation theory. Graduates of the experimental course surpassed graduates of the 39-week standard course on an overall job-sample measure, and on trouble-shooting the radar system and components. They ranked almost as well as field-experienced repairmen in troubleshooting radar components, but somewhat below them in other areas tested. It was concluded that the kinds of content identified in the Nicord analysis need to be given greater emphasis in current electronics maintenance training. (Author)

AD-481 737 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Human Resources Research Office, George Washington Univ., Alexandria, Va.
A STUDY OF CATEGORY IV PERSONNEL IN BASIC TRAINING.
Technical rept.,
by S. James Goffard, Morris Showel, and Hilton M. Bialek. Apr 66, 40p TR-66-2
Contract DA-44-188-ARO-2
Proj. DA-2J024701A712
Task 2J024701A71201

Descriptors: (*Military personnel, Performance (Human)), Manpower studies, Education, Aptitude tests, Performance tests, Effectiveness, Attitudes, Military requirements, Military training, Classification.

Identifiers: Questionnaires.

Samples of men in mental category IV and men in categories of higher mental ability (I, II, and III), who were matched according to their Army component, were selected from companies in basic combat training (BCT) at Fort Ord, Calif., Fort Dix, N. J., and Fort Jackson, S. C. Information about their backgrounds, aspirations, attitudes, aptitudes and performances during and at the end of BCT was gathered from individual interviews, ratings, and Army records. The differences between the men in category IV and those in categories I, II, and III on most of these measures were small but statistically stable. The socioeconomic backgrounds of category IV personnel tended to be poorer, and their performances in BCT were only slightly less adequate, and their attitudes toward military service were more favorable. Overlapping between the two groups was very extensive on almost every measure and on MOS assignment. Implications concerning possible special remedial educational programs for intellectually marginal manpower are discussed. (Author)

AD-641 320 **Field 5I, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Educational Research Corp., Cambridge, Mass.
A COMPARISON OF TWO METHODS OF TEACHING MORSE CODE.
Technical rept.,
by Phillip J. Rulon, and W. Douglas Brooks. 11 Jan 60, 30p
Contract N61339-294
NAVTRADEVCEN-294-2

Descriptors: (*Coding, *Teaching methods), Naval training, Training devices, Instructors, Selection, Statistical analysis, Auditory perception, Learning, Performance tests.

Identifiers: Morse code.

The purpose of this study was to compare the existing method of teaching code in the Navy with the method proposed by L. Robins. It appears that with regard to speed, there is no difference between the groups at any time during the course. One method requires about the same length of time to increase the students' speeds to certain levels, whether this speed is 4, 10, 16, or 22 words per minute. At the end of 22 weeks of instructions, students taught by one method are just as fast and as accurate as students taught by the other. The only differences between the methods that were found in this study were that during the early weeks of code instruction, the experimental subjects were more accurate than the control subjects. (Author)

AD-641 321 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Educational Research Corp., Cambridge, Mass.
A COMPARISON OF TWO METHODS OF TEACHING TYPEWRITING.
Technical rept.,
by Phillip J. Rulon, and W. Douglas Brooks. 11 Jan 60, 41p
Contract N61339-294
NAVTRADEVCEN-294-1

Descriptors: (*Teaching methods, *Typewriters), Training devices, Naval training, Learning, Performance tests, Errors.

The study was undertaken to compare the existing method of teaching typewriting in the Navy with a method proposed by L. Robins. Results are summarized as follows: (1) With regard to net typing speed at the end of the course, the methods produced equally competent typists. However, there is a tendency for the standard Navy method to be slightly superior at all periods tested during the experiment. (2) In terms of gross speed and errors considered simultaneously, the methods produced equally competent typists at the end of the course. However, during the early stages of training, the standard Navy method produces faster but less accurate typists. (3) The group trained by the standard Navy method requires significantly less time than the group trained by the Robins method to reach five words per minute; however, there is no difference between the groups in the time required to reach higher levels of typing speed. (Author)

AD-641 389 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
THE EFFECT OF PRIOR EXPERIENCE ON ACQUIRING SKILL ON A SIMULATED INERTIAL CONTROL TASK,
by Richard Geiselhart. Jul 66, 33p AMRL-TR-66-25
Proj. AF-1710
Task 171003

Descriptors: (*Transfer of training, Performance (Human)), (*Pilots, Training), Learning, Flight control systems, Spacecraft, Motor reactions, Perception (Psychology).

The performance of test pilots and college student subjects in acquiring the skill to control the attitude of a simulated space vehicle was compared. The purpose of the comparison was to investigate transfer of training to this type of task as a function of prior pilot experience and determine the degree to which one may generalize from students to pilots. There was also a further breakdown of the student group into experimental subgroups to assess the effects of type of control/display relationship and the order of part training on the acquisition of the vehicular control task. The secondary comparisons within the student group were to determine optima training conditions to make the comparison with the pilots as equitable as possible. The conclusions based on the results of the study were (1) there appear to be more positive transfer effects than negative in transitioning from flying aircraft to a simulated inertial control task; (2) the degree to which generalizations can be made from students to pilots depends on the amount of training given the students provided an optimal control/display relationship is used; (3) previously untrained subjects can achieve skill levels comparable to pilots on this type of task, but it takes more trials for the nonpilot to do so; (4) order of part training does not appear to be an important variable in training on this type of task. (Author)

AD-641 580 **Field 5I, 5J**
CFSTI Prices: HC$3.60 MF$0.50
Connecticut Coll., New London.
A STUDY OF TRANSFER IN A MOTOR TASK WITH VARYING DISPLAY-CONTROL RELATIONSHIPS,
by Robert M. Gagne, and Harriet Foster. 28 Apr 48, 35p
Contract N7onr-316 (01)
Task 1
SPECDEVCEN-316-1-3

Descriptors: (*Transfer of training, *Motor reactions), (*Learning, Motor reactions), (*Training devices, Display systems), Performance (Human), Control systems, Errors, Performance tests, Perception (Psychology), Reaction (Psychology), Reflexes.

A study was made of the amount of transfer of training resulting from practice on a motor skill involving the presentation of stimuli in one sector of an instrument face, to the same motor task practiced with the use of another sector. The task required the moving of a control handle to the right or left in response to a combination of stimuli which comprised: (1) a red or green light located above the printed instructions, 'Train Toward' and 'Train Away', respectively; and (2) a light slit appearing to the left or to the right of a target ship

silhouette on the midline of the sector in use. The positive transfer shown by the results under conditions of change in display-control relationships has some degree of importance for the practical problem of designing devices to be used as aids in the training of operators of sonar, radar, and a variety of other types of equipment involving the acquisition of perceptual-motor skills.

AD-641 581 **Field 5I, 5J**
CFSTI Prices: HC$6.60 MF$0.75
Connecticut Coll., New London.
TRANSFER OF TRAINING FROM PRACTICE ON COMPONENTS IN A MOTOR SKILL,
by Robert M. Gagne, and Harriet Foster. 1 Dec 47, 62p
Contract N7onr-316 (01)
SPECDEVCEN-316-1-2

Descriptors: (*Transfer of training, *Motor reactions), (*Learning, Motor reactions), (*Training devices, Display systems), Performance (Human), Control systems, Errors, Performance tests, Perception (Psychology), Reaction (Psychology), Reflexes.

An experiment is reported which deals with the determination of the extent to which transfer of training takes place to the learning of a complex motor skill when varying amounts of initial practice have been given on a task which is itself a component activity of the skill. Five matched groups of subjects, each containing 30 young Navy enlisted men, were used in the experiment. Each group learned a motor skill involving four differential manual responses to four lights after having practiced a preliminary task which was part of the total skill for 0, 10, 30, or 50 trials. Part training on the discrimination of reactions to upper and lower positions of the light stimuli was given to three different groups for 10, 30, and 50 trials; and part training on the discrimination of responses to red and green lights was given to one group having 30 practice trials. Following this preliminary training, the total skill involving both up-down and red-green discrimination was practiced throughout 60 trials. A control group learned the total skill without any preliminary practice. The learning of the skill was measured in terms of time required for each correct reaction, and in terms of number of errors. (Author)

AD-641 582 **Field 5I, 5J**
CFSTI Prices: HC$6.60 MF$0.75
Connecticut Coll., New London.
THE MEASUREMENT OF TRANSFER OF TRAINING,
by Robert M. Gagne, Harriet Foster, and Miriam E. Crowley. 25 Sep 47, 61p
Contract N7onr-316 (01)
SPECDEVCEN-316-1-1

Descriptors: (*Transfer of training, Measurement), (*Motor reactions, Transfer of training), Learning, Performance (Human), Effectiveness, Errors, Performance tests, Statistical functions.

The present report presents a summary of the methods whichhave been used to give quantitative expression to measures of transfer of training. It is pointed out that a number of factors in the various experimental situations which have been used to investigate transfer exert an influence upon the kind of expression which is used. Six relatively distinct methods of measuring transfer are found in the literature, and some advantages and limitations of each are described in this report. Certain desirable criteria are mentioned which transfer measures should possess for both theoretical and practical purposes. The extent to which each of the measures meets these criteria is discussed. (Author)

AD-641 583 **Field 5I, 5J**
CFSTI Prices: HC$3.60 MF$0.50
Connecticut Coll., New London. Dept. of Psychology.
TRANSFER OF DISCRIMINATION TO A MOTOR TASK.
Technical rept.,
by Robert M. Gagne, Katherine E. Baker, and Harriet Foster.6 Jul 49, 32p
Contract N7onr-316 (01)
Projs. NR-783-003, SPECDEVCEN-20-M-la
SPECDEVCEN-316-1-6
Report on Motor Skills and Job Efficiency.

Descriptors: (*Transfer of training, *Motor reactions), (*Learning, Motor reactions), Display systems, Training devices, Colors, Target discrimination, Errors, Performance (Human), Reaction (Psychology), Reflexes, Design, Human engineering.

An experiment was carried out for the purpose of investigating the transfer effects to a motor task resulting from training on one of two types of discrimination required in the learning of that task. The whole motor task required four different manual responses to be made to four light stimuli which could be discriminated on the basis of color (red or green) and on the basis of position (top or bottom). One group of 28 Navy enlisted men undertook 60 learning trials of the motor task without any previous training. Another group, composed of two sub-groups each matched with the control group, learned the task over 60 trials, following 30 trials of practice on two of the responses made to lights differing in color only ('color discrimination training'). A third group, also composed of two sub-groups matched to the control, practiced for 30 trials the responses to two lights differing in position only ('position discrimination training') before learning the whole task. Learning was measured in terms of time required to make a correct response and in terms of numbers of errors. In addition, a record was kept of the number of occurrences of each of the three possible types of incorrect responses. (Author)

AD-641 584 **Field 5I, 5J**
CFSTI Prices: HC$2.00 MF$0.50
Connecticut Coll., New London.
TRANSFER TO A MOTOR SKILL FROM PRACTICE ON A PICTURED REPRESENTATION,
by Robert M. Gagne, and Harriet Foster. 1 Jun 48, 35p
Contract N7onr-316 (01)
Projs. NR-783-003, SPECDEVCEN-20-M-la
SPECDEVCEN-316-1-4

Descriptors: (*Transfer of training, *Motor reactions), (*Learning, Motor reactions), (*Training devices, Display systems), Performance (Human), Control systems, Errors, Performance tests, Perception (Psychology), Reaction (Psychology), Reflexes.

An experiment is reported which involves the measurement of transfer of training to a motor task following varying amounts of preliminary practice on a paper-and-pencil representation of the task. Five matched groups of subjects, each containing 30 Navy enlisted men, were used in the experiment. Each group learned a motor skill which required four different manual responses to four panel lights, differing in color and position. A control group had no preliminary practice; the other groups were given 8, 16, 24, and 48 trials, respectively, on the paper-and-pencil task. The motor task, involving differential reactions to two sets of switches numbered 1 and 2, located on the left and on the right of the center line of a reaction panel, was practiced in all groups throughout 60 trials. The learning of the motor task was measured in terms of time required for each correct reaction and in terms of numbers of errors. (Author)

AD-641 585 **Field 5I, 5J**
CFSTI Prices: HC$2.00 MF$0.50
Connecticut Coll., New London. Dept. of Psychology.
ON THE RELATION BETWEEN SIMILARITY AND TRANSFER OF TRAINING IN THE LEARNING OF DISCRIMINATIVE MOTOR TASKS.
Technical rept.,
by Robert M. Gagne, Katherine E. Baker, and Harriet Foster.1949, 50p
Contract N7onr-316 (01)
Projs. NR-783-003, SPECDEVCEN-20-M-la
SPECDEVCEN-316-1-5
Report on Motor Skills and Job Efficiency.

Descriptors: (*Transfer of training, *Motor reactions), (*Learning, Motor reactions), Performance (Human), Reaction (Psychology), Reflexes, Training devices, Design, Conditioned reflex, Human engineering.

An analysis is presented of the kind and amount of transfer to be expected when an individual learns a first task and then proceeds to a second task in which certain types of alterations have been made. The kind of learning task considered is discriminative motor learning, in which a number of different responses to a number of different stimuli must be acquired. It is contended that the alterations which may be made from one task of this sort to another are most clearly stated in terms of the similarities among the stimuli and among the responses of each task. In other words, the stimuli of the second task may be made more similar, or less similar, to each other than the stimuli of the first task; and likewise the responses of a second task may be made more similar, or less similar, to each other than are the responses of the first task. Still another kind of alteration which is described involves changing the stimulus-response relationships from one task to another. This means that the individual is required to learn in the second task associations which are the reverse of those learned in the first task. That is, where he has learned in the first task the associations Stimulus 1 -- Response 1 and Stimulus 2 -- Response 2, he is required in the second task to learn Stimulus 1 -- Response 2 and Stimulus 2 -- Response 1. (Author)

AD-641 586 **Field 5I, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Connecticut Coll., New London.
TRANSFER OF TRAINING TO A MOTOR SKILL AS A FUNCTION OF VARIATION IN RATE OF RESPONSE.
Technical rept.,
by Robert M. Gagne, Katherine E. Baker, and Ruth C. Wylie. 15 Aug 49, 25p
Contract N7onr-316 (01)
Projs. NR-783-003, SPECDEVCEN-20-M-1a
SPECDEVCEN-316-1-10
Rept. on Human Engineering Synthesis of Basic Information.

Descriptors: (*Transfer of training, *Motor reactions), (*Learning, Motor reactions), (*Training devices, Display systems), Performance (Human), Reaction (Psychology), Reflexes, Errors, Perception (Psychology), Performance tests, Tracking, Human engineering.

An experiment is reported which deals with transfer of training as a function of differences in response rate between the training and final tasks. The tasks employed in this experiment involved turning a crank so as to keep a pointer in alignment with a target which moved irregularly back and forth over a 120 degree sector on the circumference of a dial. The results of the experiment have a number of implications for problems which arise in the training of certain types of motor tasks involving pursuit reactions. The experiment was specifically designed to study the transfer effects of training on a task which differs from a final task with respect to the responses required, but which involves stimuli identical to those of the final task. Knowledge of the effects of response variation has obvious relevance to the problems arising in redesigning instruments or devising synthetic training devices. In each of these cases it is necessary to know to what extent differences in the responses

required to operate the two pieces of equipment affect the ease with which the final task in question may be learned. (Author)

AD-641 587 **Field 5I, 5J**
CFSTI Prices: HC$3.60 MF$0.50
Connecticut Coll., New London.
TRANSFER OF TRAINING TO A MOTOR TASK IN RELATION TO STIMULUS SIMILARITY.
Technical rept.,
by Katherine E. Baker, and Robert M. Gagne. 8 Aug 49, 34p
Contract N7onr-316 (01)
Projs. NR-783-003, SPECDEVCEN-20-M-1a
SPECDEVCEN-316-1-8

Descriptors: (*Transfer of training, *Motor reactions), (*Learning, Motor reactions), (*Training devices, Design), Stimulation, Reaction (Psychology), Reflexes, Colors, Performance (Human), Errors, Performance tests, Human engineering.

An experiment was carried out to investigate the relation between similarity of stimuli of two motor tasks and the amount of transfer between them. Each of five matched experimental groups, consisting of 25 young Navy men each, was trained on a task requiring two different responses; one to a light of given color and the other to any of six other colors. Following training, each of the groups proceeded to the learning of a different second task. The final tasks differed from the training task in that one of the six non-standard lights of the training task was employed as the standard color in the final task, and what was the standard color during training became one of six non-standard colors of the final task. The degree of resemblance between training and final tasks could be expressed in terms of the similarity between the standard stimuli of the two tasks. The series of colored stimulus lights was selected so that the stimuli were distributed at equal intervals along a psychophysical scale of color similarity in j.n.d. units. Thus, the difference between successive colors in the series was constant and the series may be taken as representing six equal similarity steps over approximately one half of the visible spectrum. The final tasks chosen for investigation represented 0, 1, 2, 4, and 6 similarity-step differences from the common training task. (Author)

AD-641 588 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
ACADEMIC GRADES OF STUDENTS IN THE NAVAL SCHOOL OF PRE-FLIGHT.
Interim rept.
20 Aug 48, 34p
Contract N7onr-383 (01)
Projs. NR-782-002, SDC-20-E-6
SPECDEVCEN-383-1-6
Rept. on Educational Research Project.

Descriptors: (*Naval aviation, Students), (*Aviation personnel, Selection), Tests, Pilots, Education, Training, Statistical tests, Test construction (Psychology).

An experiment was designed to determine the extent and effect of the malfunctioning of the grading system used by the Naval School of Pre-Flight. Inspection of the grades assigned to eight classes revealed substantial differences in average quiz grades in different subjects, average examination grades in different subjects, and in average grades in the same subjects when different examinations were used. The nature of these differences were such that they could not be accounted for by postulating differences in the general ability levels of different classes. The final grades of five classes as now recorded were recomputed, using a different grading procedure based on standard scores. The rank order attained by the students of these five classes under the two grading systems was compared. Marked differences in ranks were disclosed. A statistical test was applied in order to determine which of these rankings was more nearly correct. The standard score method of grading was indicated to be the better system. An ATI changing the method of handling student grades in Pre-Flight school is suggested as an appropriate method of implementing these findings. (Author)

AD-641 589 **Field 5I**
CFSTI Prices: HC$12.60 MF$0.75
Richardson, Bellows, Henry and Co., Inc., New York.
A SUMMARY OF OPERATIONAL RESEARCH IN THE NAVAL AIR TRAINING COMMAND.
Final rept.,
by H. C. Knutson. 9 Jun 49, 124p
Contract N7onr-383 (01)
Projs. NR-782-002, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-13
Rept. on Psychological Studies of Training Techniques.

Descriptors: (*Naval aviation, Training), Research program administration, Officer personnel, Instructors, Teaching methods, Training devices, Personnel management, Naval personnel, Military requirements, Standards, Reports, Abstracts, Operations research, Applied psychology.

The scope of the operational research in ground aviation training, performed by the contractor in the Naval Air Training Command, was separated into four functions, all coordinated according to an over-all study plan as follows: (1) The Survey Function; (2) The Consulting Function; (3) The Research Function; (4) The Library Function. The work performed upon these four functions is reviewed in Parts II to V of this report. Part I of the report presents the over-all recommendations for the continuation of operational research by permanent staff of the Naval Air Training Command, as well as a detailed statement of purpose and a historical sketch of its program. Abstracts of all Technical Reports issued during the period of the contract are found in appropriate parts of the report. (Author)

AD-641 590 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
CONSTRUCTION OF THREE MEASURES FOR INSTRUCTOR EVALUATION.
Interim rept.
20 Jul 48, 48p
Contract N7onr-383 (01)
Projs. RBH-128, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-5
Rept. on Educational Research Project.

Descriptors: (*Naval aviation, Instructors), (*Instructors, Selection), Effectiveness, Naval training, Performance (Human), Personality, Behavior, Attitudes.

The report summarizes the steps taken in the development of instruments for appraising the effectiveness of ground school instructors in the Naval Air Training Command. The problems which prompted the undertaking of the project and benefits accruing are pointed out along with the need for further steps in the validation and refinement of the measures produced. (Author)

AD-641 591 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
PRELIMINARY VALIDATION OF THE INSTRUCTORS EVALUATION REPORT.
Technical rept.,
by H. C. Knutson. 20 Apr 49, 44p
Contract N7onr-383 (01)
Projs. NR-782-002, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-9
Rept. on Psychological Studies of Training Techniques.

Descriptors: (*Naval aviation, Instructors), (*Instructors, Selection), Effectiveness, Naval training, Performance (Human), Personality, Behavior, Attitudes.

The report shows the steps taken and summarizes the results obtained in an investigation of the validity of the Instructor's Evaluation Report. The procedure included two main features: (1) accomplishment of the IER by appropriate senior instructors and administrators for a total of 107 ground school instructors, and (2) collection of rankings of instructors by their superiors and by their students.

AD-641 592 **Field 5I**
CFSTI Prices: HC$1.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
SUPPLEMENTARY REPORT ON PROJECT ON PRE-FLIGHT GRADES.
Technical rept.,
by H. C. Knutson. 25 Apr 49, 13p
Contract N7onr-383 (01)
Projs. NR-782-002, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-10

Descriptors: (*Naval aviation, Students), (*Aviation personnel, Selection), Naval training, Test construction (Psychology), Education, Statistical analysis, Standardization.

Probably the most effective way of reducing the present cost of Aviation Training would be to develop tests that would eliminate, in advance, the 30 to 50 percent of the students who fail to complete training. The predictive efficiency of any test or battery of tests developed, however, is rigorously limited by the amount of random error or systematic bias present in the criterion components. This implies, for Aviation Research, that the expenditure of funds and effort on the development of selection devices should be preceded by the complete development of valid standardized methods of evaluating the performance of the aviator during training, and after his assignment to duty. The problem of random error is particularly acute in the grading of training flight performance and in the rating of officer-like qualities, two important areas in which the raw grade is a product of human judgment alone. Since these grades make up the larger proportion of the available data on aviation student competence, and since the level of this grading is separately determined for each student by the judgments of individuals of differing and inconstant standards, it can be expected that no aviator-selecting devices will prove very effective unless and until grading in these areas has been standardized. (Author)

AD-641 593 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
A STUDY OF INDIVIDUAL DIFFERENCES AMONG NAVAL AVIATION STUDENTS.
Technical rept.
10 May 49, 43p
Contract N7onr-383 (01)
Projs. NR-782-002, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-12

Descriptors: (*Naval aviation, Students), (*Aviation personnel, Selection), Naval training, Psychometrics, Correlation techniques.

The report is concerned with the following objectives in student administration: (1) Elimination from the program, at the earliest possible moment, of those students who will fail later. (2) Identification of those students who, if awarded extra time, will successfully complete the program. Since the training of Naval aviation students costs money, both training of unfit students and attrition of fit students are wasteful. A battery of tests was administered experimentally to 560 entering students. Scores made by students on these tests were compared with subsequent grades in ground school. Those tests useful for predicting success and failure were identified. An experiment simulating actual use of test scores for administrative decisions concerning failing students demonstrated that substantial money savings could be effected by such use. Recommendations were made that the more valid tests be administered to all entering students, that a profile record of each student's test scores be executed, and that these profile scores be used at the time of a student's first failure to assist in administrative decisions concerning the student. (Author)

AD-641 594 **Field 5I**
CFSTI Prices: HC$3.60 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
STUDY SKILLS OF NAVAL AVIATION STUDENTS: ANALYSIS OF THE PROBLEM AND RECOMMENDATIONS.
Interim rept.
21 Jun 48, 34p
Contract N7onr-383 (01)
Projs. RBH-128, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-4

Descriptors: (*Naval aviation, Students), Teaching methods, Learning, Naval training, Standardization, Handbooks, Effectiveness.

Means were devised for improving and standardizing the study practices of Naval air trainees. A manual, 'Successful Study Methods,' together with a Plan for Implementing the Manual were developed to meet the described needs. The manual contains only material that has been demonstrated by research to contribute to superior learning, described at a language level calculated not to present equivocal meanings to even the lowest level trainee. It incorporates a specific and observable study technique that is widely applicable and at the same time produces in the form of study notes a means whereby the students proper conformance to the method can be readily ascertained. The method and manual are of such simplicity as to demand minimal time both for the indoctrination of students in their use and the indoctrination of instructors and duty officers in their installation and supervision.

AD-641 595 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
THE DEVELOPMENT OF AVIATION TRAINING SYLLABUS MATERIAL.
Technical rept.,
by H. C. Kuntson. 20 Aug 48, 33p
Contract N7onr-383 (01)
Projs. NR-782-002, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-7

Descriptors: (*Naval aviation, Training), Textbooks, Teaching methods, Instructors, Education, Naval training.

The report summarizes the steps taken in the Educational Research Project to assist CNATra in the improvement of its syllabi, texts, and lesson plans and in the ground schools of the Naval Air Training Command. These steps involved a considerable amount of consultation with instructors and administrative officers in the interpretation of findings and explanation of the purposes of educational goals found in conflict with administrative procedure. The report includes a suggested ATI to activate the recommendation that a manual be issued for the instruction of all concerned in syllabus preparation; a 'Manual for Syllabus Construction'; and an enclosure to the manual on 'Principles of Educational Psychology.' The manual was developed from the study of the conditions of syllabus preparation and use in the Naval Air Training Command. The purpose of the manual is to insure uniform methods of subject-matter presentation.

AD-641 596 **Field 5I**
CFSTI Prices: HC$5.60 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
REPORT ON BILLET ANALYSIS AND EVALUATION.
Interim rept.
15 Jun 48, 51p
Contract N7onr-383 (01)
Projs. RBH-128, 20-E-6
SPECDEVCEN-383-1-3
Report on Educational Research Project.

Descriptors: (*Job analysis, *Naval aviation), Naval training, Instructors, Effectiveness, Performance (Human), Personnel management, Education, Military requirements.

A comprehensive study of those billets entailing ground training functions in the Pre-flight and Basic phases of Naval Air Training was undertaken. The objectives of the study were as follows: (1) To obtain a comprehensive and accurate picture of the work entailed in the performance of each billet. (2) To obtain specifications of background, knowledges, skills and abilities necessary for satisfactory billet performance. To make a comparison of all billets as to level of difficulty and ability required. To establish for each billet an equitable rank commensurate with billet difficulty level, on the basis of this comparison. To compare billet ranks thus established with the ranks of the present incumbents of these billets. To make recommendations for appropriate readjustments based on this comparison. To make an intensive study of the various billets in light of the over-all mission of Naval Air Training. To make appropriate recommendations for the addition of new billets, for changes in organization, for the elimination of billets and for restructuring or altering the duties currently performed on billets.

AD-641 597 **Field 5I**
CFSTI Prices: HC$2.60 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
AMPLIFYING THE INSTRUCTOR TRAINING PROGRAM IN THE NAVAL AIR BASIC TRAINING COMMAND.
Interim rept.
12 Jun 48, 27p
Contract N7onr-383 (01)
Projs. RBH-128, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-2

Descriptors: (*Naval aviation, Instructors), (*Instructors, Training), Training devices, Teaching methods, Effectiveness.

The report summarizes work accomplished in reorganization of the instructor training curriculum and considerations for staffing an instructor training unit. The basic problem of the Naval Air Training Command with regard to instructors is the conversion of qualified Naval Aviators to classroom instructors.

AD-641 598 **Field 5I**
CFSTI Prices: HC$7.60 MF$0.75
Richardson, Bellows, Henry and Co., Inc., New York.
EDUCATIONAL RESEARCH PROJECT.
Interim rept.
22 Dec 47, 78p
Contract N7onr-383 (01)
Projs. RBH-128, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-1

Descriptors: (*Naval aviation, Training), Instructors, Naval training, Teaching methods, Training devices, Training films, Textbooks, Students, Learning, Effectiveness.

Efforts were made to assist the Naval Air Training Command in improving the ground training aspects of its aviation training programs. These programs involve at present the training of over a thousand Naval aviators a year. Most of the instructors are Naval aviators, whose tours of duty in the Naval Air Training Command are typically of two years' duration. Their flying backgrounds are considerably superior, in general, to their subject-matter backgrounds in the technical supporting areas of ground training, and this undoubtedly is one reason for the general belief that the flight instruction is superior to the ground instruction. In order to cope with this situation, very explicit and detailed syllabi were prepared for all courses. Almost all essential information is presented by the lecture method. A number of training films and a variety of demonstration materials and special training devices are also used.

AD-641 599 **Field 5I**
CFSTI Prices: HC$14.90 MF$1.00
Richardson, Bellows, Henry and Co., Inc., New York.
THE TRAINING SURVEY: A METHOD OF EVALUATING TRAINING WITH THE 1948 ANNUAL SURVEY AS AN EXAMPLE.
Interim rept.
20 Aug 48, 153p
Contract N7onr-383 (01)
Projs. NR-782-002, SPECDEVCEN-20-E-6
SPECDEVCEN-383-1-8

Descriptors: (*Naval aviation, Training), Teaching methods, Training devices, Instructors, Students, Job analysis, Textbooks, Training films, Learning, Reports.

Surveys and reports are presented on the following: Classroom Instruction and Course Techniques in Pre-Flight and Basic Ground Schools; Examinations and Other Evaluation Techniques for Student Instruction, Pre-Flight and Basic; Survey of Training Development and Research, Including Attitudes Towards It; Training Billet Reorganization Survey; Survey of Instructors Basic Training Unit; Survey of Instructor Qualifications and Instructor Evaluation.

AD-641 600 **Field 5I, 5E**
CFSTI Prices: HC$3.00 MF$0.75
Richardson, Bellows, Henry and Co., Inc., New York.
DEVELOPMENT OF EVALUATION PROCEDURES FOR PROTOTYPE DEVICES.
Technical rept., revised ed.
Aug 62, 78p
Contract N7onr-383 (02)
Proj. NR-783-008, RBH-181
SPECDEVCEN-383-2-1-suppl-1
Research supplement to The Development of an Evaluation Procedure for Training Aids and Devices. Revision of manuscript submitted Feb 1950.

Descriptors: (*Training devices, Effectiveness), (*Human engineering, Training devices), Naval training, Instructors, Training films, Simulation, Maintenance, Design, Costs, Teaching methods.

The over all purpose of the project required a review of available sources of information as to methods and procedures presently used in the ev-

aluation of training aids and devices. The purpose of this was threefold: (1) To interpret, from what had been done in evaluation of training aids and devices, the kinds of procedures and criteria which could be best applied to the present problem. (2) To classify the areas of training accomplishment through the use of aids and devices, so as to prepare materials for the rating and description of the effectiveness of this training. (3) To classify training aids and devices from the point of view of their training functions, so as to prepare procedures descriptive of the various classes. (Author)

AD-641 601 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
VALIDATION FIELD STUDY OF EVALUATION PROCEDURES.
Technical rept., Revised ed.
Aug 62, 26p
Contract N7onr-383 (02)
Projs. RBH-181, NR-783-008
SPECDEVCEN-383-2-1-suppl-2
Revision of manuscript submitted Apr 1950. Research supplement to The Development of an Evaluation Procedure for Training Aids and Devices.

Descriptors: (*Training devices, Effectiveness), Naval training, Teaching methods, Human engineering, Students, Instructors, Attitudes, Experimental data, Correlation techniques.

The experiment was designed to test the validity of the three device evaluation procedures which had been constructed and revised on the basis of field trials. The experiment involved several purposes: (1) To establish the criterion scores reflecting the 'over-all training effectiveness' of a number of training devices, as bases or standards by which the evaluation procedures could be judged or validated. (2) To measure the effectiveness of the three evaluation procedures, each as a whole and item by item. (3) To furnish a valid basis for the revision of the three experimental procedures. The criterion consisted of independent estimates of the over-all merit of each device for its training purposes. These were in terms of comparative ratings of instructors and training officers who were well acquainted with the devices rated. (Author)

AD-641 824 **Field 5I, 19E**
CFSTI Prices: HC$3.00 MF$0.75
Richardson, Bellows, Henry and Co., Inc., New York.
STUDY OF BASIC FIXED GUNNERY,
by Harold A. Edgerton, Robert M. Tomlinson, Thomas R. O'Malley, and Robert Schmidt. 15 Jul 52, 65p
Contract N7onr-383 (05)
SPECDEVCEN-383-5-3

Descriptors: (*Aerial gunnery, Naval training), (*Naval training, *Aerial gunners), Flight, Training devices, Training films.

The study of Naval Basic Aerial Fixed Gunnery was done to determine the major problems in training for the purpose of making recommendations for improved training procedures, devices and aids. Sources of data included student and instructor interviews, records of student errors, and observations in classrooms and in flight. Training is actually mastering two precision maneuvers, the high side run and the flat side run. Results show basic differences in the performance of students and instructors in flying these maneuvers. Instructors depend on cues which relate to the overall situation in terms of the relative motion of own plane and target plane. The students, however, tend to focus on specific isolated cues, failing to appreciate the total relative motion picture. Analyses of the data revealed the nature and importance of the student's learning problems in each segment of the two gunnery runs. These problems were then related to current ground and flight training procedures in gunnery. Consideration was also given to the stated goals of gunnery training. (Author)

AD-641 850 **Field 5I**
CFSTI Prices: HC$10.60 MF$0.75
Richardson, Bellows, Henry and Co., Inc., New York.
COMBAT RECOGNITION REQUIREMENTS,
by Raymond A. Katzell, Kenneth F. Thomson, Sheldon S. Zalkind, and Eileen Lange. 15 Apr 52, 110p
Contract N7onr-383 (06)
SPECDEVCEN-383-6-1

Descriptors: (*Army training, *Target recognition), Warfare, Identification, Visual perception, Auditory perception, Touch, Smell, Performance (Human), Military requirements.

The study was undertaken in order to evaluate recent and current Army recognition training, to find out how that training relates to the means by which soldiers actually recognize targets in combat, and to make recommendations for improvement in training. Recognition, is restricted to that made by direct observation without the use of mechanical aids, such as radar. It is that recognition which is possible to a man through the use of his ability to see, hear, touch and smell. One of the important conclusions of this investigation is that in spite of the increasing number of mechanical devices by which recognition can be assisted, there is a continuing vital need for the individual to be able to rely on his own capacities. Men can and have learned recognition the hard way. They have taught one another. Even when it was inefficient to pool their recognition skills, they have done so because they had to. The study found that men need not only planned training in recognition, but a different and more extended kind of training, if combat performance is to be improved. (Author)

AD-641 879 **Field 5I**
CFSTI Prices: HC$7.60 MF$0.75
Richardson, Bellows, Henry and Co., Inc., New York.
NAVY RECOGNITION TRAINING.
by Raymond A. Katzell, Kenneth F. Thomson, Sheldon S. Zalkind, and Edward J. Gray. 31 Jul 52, 73p
Contract N7onr-383 (06)
SPECDEVCEN-383-6-2

Descriptors: (*Target recognition, *Naval training), Training devices, Naval personnel, Training films, Motivation, Learning, Submarine personnel, Aviation personnel, Identification.

The study was undertaken to investigate Navy recognition training, to find out how that training relates to the means by which men actually recognize targets in combat, and to make recommendations for improvements in training. While the study did not extend to experiments to provide final answers to specific problems, research techniques were used in gathering, analyzing, and interpreting the data on Navy recognition training. (Author)

AD-641 909 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Army Personnel Research Office, Washington, D. C.
ABSTRACTS OF U. S. APRO RESEARCH PUBLICATIONS -- FY 1966.
Technical research note,
by EMMA E. Brown. Sep 66, 45p TRN-177

Descriptors: (*Army personnel, Army research), Military publications, Abstracts, Military training, Bibliographies, Psychometrics, Libraries.

Contents: Abstracts of FY 1966 research publications (Technical research reports, Technical research notes, Research studies, Research memorandums); Research tasks, U. S. Army Personnel Research Office; Depository libraries; Army-personnel programs utilizing psychological research test products of the U. S. Army Personnel Research Office.

AD-641 912 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Richardson, Bellows, Henry and Co., Inc., New York.
A GUIDE FOR DETERMINING TRAINING AID AND DEVICE REQUIREMENTS,
by Douglas H. Fryer, Mortimer R. Feinberg, and Robert M. Tomlinson. 15 May 52, 43p
Contract N7onr-383 (04)
SPECDEVCEN-383-04-1

Descriptors: (*Training devices, Military requirements), Determination, Military training.

The guide outlined a simple and effective method for determining the training aid and device requirements of a military installation. It is possible to apply this technique in a wide variety of training situations. One will achieve the most effective results by utilizing this procedure in its present form, however, it can be modified slightly to meet the needs of a particular training center. (Author)

AD-641 964 **Field 5I, 15G, 15E**
CFSTI Prices: HC$3.00 MF$0.75
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
QUALIFICATIONS AND RELATED TRAINING FOR NAVAL RESERVE OFFICERS (1105) NAVAL WARFARE/OPERATIONS, SURFACE, MILITARY SEA TRANSPORTATION SERVICE AND NAVAL CONTROL OF SHIPPING ORGANIZATION.
by C. A. Hart. Nov 66, 63p WRM-67-8
Proj. PF017010201

Descriptors: (*Naval training, *Officer personnel), Military requirements, Armed forces transportation, Shipping (Marine), Naval operations, Warfare.

The research memorandum reports on the development of qualifications standards and related training for all 1105 officers assigned to the Military Sea Transportation Service (MSTS) and Naval Control of Shipping Organization (NCSORG). These qualifications standards were developed as a part of the professional development system for Naval Reserve officers not on active duty. It should be noted that the Military Sea Transportation Service (MSTS) and the Naval Control of Shipping Organization (NCSORG) qualifications outlined are in addition to the requirements for all 1105 officers outlined in NAVPERS 15988-1. The conclusion reached was that the addition of type warfare qualifications for Military Sea Transportation Service (MSTS) and Naval Control of Shipping Organization (NCSORG) is a logical step of professional training in the professional development system. (Author)

N66-38721 **Field 5I**
CFSTI Prices HC$3.00 MF$0.75
Washington Univ., St. Louis, Mo. Dept. Of Economics.

DEMAND FOR ENGINEERS AND SCIENTISTS.
by H. Folk. Sep 66, 78p NASA-CR-78487
Grant NSG-342
Its Working Paper No. 6608

Descriptors: *Manpower, *Mathematics, *Physical science, *United states, Chemistry, Demand, Development, Economics, Employment, Government, Industry, Labor, Market, Pattern, Personnel, Physical, Requirement, Research, Science.

For abstract, see STAR 04 23.

AD-227 192 See Field 9E

AD-641 423 See Field 5A

AD-641 623 See Field 5J

AD-641 652 See Field 5A

AD-641 813 See Field 5J

AD-641 832 See Field 20J

AD-641 851 See Field 5A

AD-641 925 See Field 13B

AD-641 955 See Field 5A

5J. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

AD-641 382 **Field 5J**
Not available from CFSTI.
Washington State Univ., Pullman. Dept. of Psychology.
SHORT-TERM RETENTION AS A RATIO OF AVERAGE STORAGE LOAD TO AVERAGE LOAD REDUCTION,
by Kenneth E. Lloyd, William A. Johnston, and Sandra A. Belcher. 26 Jun 64, 9p
Grant AF-AFOSR-256-63
Proj. AF-9778
Task 977801
AFOSR-66-1153
Availability: Published in The Journal of General Psychology v74 p347-53 1966.

Descriptors: (*Retention, Psychometrics), Recall, Analysis of variance.

An attempt was made to relate short-term recall to a ratio of the average number of items being stored (when a request for recall occurred) to the average number of items requested. When the ratio is unity, all stored items are requested. As the ratio departs from unity, fewer items are requested per call in relation to the number being stored. Mean recall errors increased as the ratio increases. The shape of the function remains constant despite changes in the ease with which the stored items can be encoded. Within any one ratio, the recall scores are rank ordered directly with both variables in the ratio. (Author)

AD-641 385 **Field 5J**
Not available from CFSTI.
Pittsburgh Univ., Pa. Graduate School of Business.
EFFECTS ON THE SUBSEQUENT PERFORMANCE OF NEGOTIATORS OF STUDYING ISSUES OR PLANNING STRATEGIES ALONE OR IN GROUPS,
by Bernard M. Bass. 19 Oct 65, 33p
Contract Nonr-624 (14)
Psychological Monographs: General and Applied v80 n6 1966.
Availability: American Psychological Association, Inc., 1200 Seventeenth St., N. W., Washington, D. C., HC $1.50.

Descriptors: (*Bargaining, *Group dynamics), Decision making, Performance (Human), Social psychology, Behavior, Analysis of variance.

In 3 successive experiments, as representatives of management or labor, 256 graduate business students bargained individually with counterparts on 9 issues. 2 of the 4 treatments of each experiment required groups of Ss to plan strategies or to study the issues without considering bargaining tactics. Various kinds of prenegotiation study groups were contrasted. Also, some Ss planned strategics or studied alone rather than in groups. In the 1st and 3rd experiments in which deadlines were imposed, those negotiators who had prepared themselves by planning strategies were more likely to deadlock, more so if they had planned in advance in groups rather than alone. Detailed analyses are presented of the effects of the treatments within each experiment on specific contract outcomes, the overall favorability to the company of the settlements, the departure of the agreements reached from community norms and the speed of settlement. The latter 2 outcomes (departure and speed) were highly correlated. Task-oriented negotiating pairs reached settlement closer to community norms while self-oriented negotiating pairs tended to agree more closely on the importance of the issues. Company and union representatives favored using different tactics with different concerns in mind. (Author)

AD-641 395 **Field 5J**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences.
LEARNING AND SHORT-TERM RETENTION OF PAIRED ASSOCIATES IN RELATION TO SPECIFIC SEQUENCES OF INTERPRESENTATION INTERVALS.
Technical rept.,
by Robert A. Bjork. 11 Aug 66, 75p TR-106
Contract Nonr-225 (73)
Proj. NR-154-218

Descriptors: (*Word association, *Learning), Memory, Retention, Performance (Human), Experimental design, Mathematical analysis, Behavior.

Identifiers: Reinforcement (Psychology).

The dissertation reports a study of short-term retention in paired-associate list learning. One purpose of the study was to ascertain empirically the extent to which short-term memory influences performance during the acquisition of a list of paired associates; a second was to gather evidence with respect to the conceptual relationship of short-term memory and learning. The particular experimental behavior chosen for study was the learning of a list of paired associates by means of a series of anticipation trials. An anticipation trial starts with the presentation of a stimulus to which the subject attempts to anticipate the correct response and ends with a presentation of the correct response. During an experimental session, the trials on any one item (presentation sequence) are characterized by a sequence of interpresentation intervals; that is, any two successive presentations of an item are separated by some number of trials on other items. The experimental design modified the standard anticipation procedure in two ways. (1) The series of trials was generated by a computer-implemented algorithm designed to yield a uniform distribution of interpresentation intervals. (2) All subjects had the same series of trials in the sense that each had the same set of presentation sequences. The confounding of item differences with the effects of the presentation sequences was avoided by counterbalancing across subjects the assignment of items to presentation sequences. (Author)

AD-641 417 **Field 5J, 12A**
Not available from CFSTI.
Army Medical Research Lab., Fort Knox, Ky.

A SENSITIVE RANK TEST FOR COMPARING THE EFFECTS OF TWO TREATMENTS ON A SINGLE GROUP.
Revised ed.,
by James N. Cronholm, and Samuel H. Revusky. 1 Dec 64, 17p USAMRL-665
Proj. DA-3A014501B74C
Task 00
Revision of manuscript submitted 16 Sep 64.
Availability: Published in Psychometrika v30 n4 p459-67 Dec 1965.

Descriptors: (*Psychometrics, *Statistical tests), Sampling, Probability, Test construction (Psychology), Sensitivity.

Identifiers: Group testing.

By taking advantage of an experimental design which increases the number of observations per subject, the sensitivity of the proposed test is increased. In the first of a series of subexperiments, the score of a randomly selected experimental S is ranked with the scores of the remaining (control) Ss, and the experimental S is discarded. This procedure is repeated until one S remains. The test criterion, R sub n, is the sum of ranks of the experimental Ss; its exact sampling distribution, a normal approximation, and the sensitivity of the test relative to the Wilcoxon T, are described. Because of the large number of scores obtained, the test is particularly useful when preparing Ss is more costly than testing them, e.g., in tests following involved conditioning procedures. Since each S is discarded after experimental treatment, the test fills a real need in studies involving radiation, ablation, or other irreversible treatments. (Author)

AD-641 437 **Field 5J**
Not available from CFSTI.
California Univ., Berkeley. Inst. of Human Learning.
SECOND CALIFORNIA CONFERENCE ON VERBAL LEARNING AND VERBAL BEHAVIOR,
by B. J. Underwood, and L. Postman. 1963, 15p
Grant AF-AFOSR-229-63
Proj. AF-9778
Task 977802
AFOSR-66-1158
Availability: Published in Journal of Verbal Learning and Verbal Behavior v2 n2 p203-15 Aug 1963.

Descriptors: (*Verbal behavior, Symposia), (*Learning, Symposia), Recall.

The second of a series of three research conferences on verbal learning and verbal behavior was held from 13-17 May 1963, at the University of California Conference Center at Lake Arrowhead. The purpose of these conferences is to provide an opportunity for the exchange of information on current research developments in the areas of verbal learning and verbal behavior. The discussions were informal, with exclusive emphasis on the discussion of ongoing research and current methodological and theoretical problems. A half-day session was allotted to each of the ten participants, during which he was free to present any materials of his choosing. (Author)

AD-641 470 **Field 5J**
Not available from CFSTI.
Princeton Univ., N. J. Dept. of Psychology.
SYMBOLS VIA LEARNING SET,
by Mymon Goldstein, and Robert J. Weber. 14 Dec 65, 10p
Grants AF-AFOSR-243-63, PHS-MH-1072501
Proj. AF-9778
Task 977801
AFOSR-66-1147
Prepared in cooperation with Kenyon Coll., Gambier, Ohio.
Availability: Published in Perceptual and Motor Skills v22 p351-8 1966.

Descriptors: (*Learning, Performance (Human)), Perception (Psychology), Stimulation, Problem solving, Experimental design, Statistical analysis.

Identifiers: Symbols.

Symbols were taught by means of a learning set procedure in which each problem was divided in two parts. Part One provided a context where meanings were picked up by transient stimuli. Part Two related the transient stimuli to the intended symbols on the basis of these meanings. The intended symbols were nonsense forms that recurred in all problems. The transient stimuli were nonsense forms that changed after each problem. Forty college students served as Ss. They all exhibited learning-to-learn effects, and thirty-three mastered the symbols. Learning-to-learn effects occurred earlier than symbol mastery. Number of trials in Part One was varied systematically, without much consequence. (Author)

AD-641 476 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Office of Aviation Medicine, Federal Aviation Agency, Washington, D. C.
PROBLEMS IN DEPTH PERCEPTIONS: EQUIDISTANCE JUDGMENTS IN THE VICINITY OF A BINOCULAR ILLUSION.
Master's thesis,
by Frank L. Agee, Jr., and Walter C. Gogel. 1964, 12p
AM-66-24

Descriptors: (*Space perception, *Illusions), Visual perception, Vision, Background, Aviation medicine, Errors.

Judgments of the size and distance of objects are sometimes made in aircraft under background-viewing conditions that may themselves create false sensory impressions (illusions). In this study, the effects of a background illusion on judgments of the size and distance of objects that were independent of that background were examined. Misleading size cues associated with a binocularly observed trapezoidal window produced an apparent depth orientation of the window that was different from its physical orientation. As expected, it was found that errors occurred in adjusting two other objects (disks) to apparent equidistance with each other in the presence of the window and that the direction of the errors in apparent equidistance was related to the direction of the errors in the perceived slant of the trapezoidal window. It was less clear that errors in the judgment of apparent equidistance occurred when the orientation of the window and the separation of the disks were vertical rather than horizontal. Possible explanations for discrepancies between the magnitude of the perceptual errors associated with the trapezoidal window and those associated with the equidistance judgments are discussed. (Author)

AD-641 477 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Civil Aeromedical Inst., Oklahoma City, Okla.
PROBLEMS IN DEPTH PERCEPTION: PERCEIVED SIZE AND DISTANCE OF FAMILIAR OBJECTS,
by Walter C. Gogel, and Henry W. Mertens. Jun 66, 23p
AM-66-22

Descriptors: (*Space perception, Performance (Human)), Visual perception, Aviation safety, Vision, Retina, Perception (Psychology).

Judgments of the distance of familiar objects, especially other aircraft, are critical aspects of flight safety. In this study, the perception of distance as a function of the retinal size of a familiar object was investigated by simulating a stationary or a radially moving playing card in an otherwise dark visual field. When different observers were first presented with the different sizes of the stationary object, a relation between retinal size and perceived distance occurred only if perceived size was taken into consideration and only for the largest two of the three retinal sizes used. It seems that familiar size was a cue to perceived absolute distance when the simulated distances were approximately 3 feet or less, but not approximately 6 feet from the observer. Judgments of the distance of subsequent static presentations of cards, while usually more veridical than first presentations, were found to be dependent upon distance judgments made in the prior presentations. The importance of interactions between presentations or within changing presentations was reflected in the modifications of the dynamic adjustments that resulted from using different starting sizes. The results from this experiment support the view that relational distance cues occurring between successive or sequential presentations are dominant over absolute distance cues occurring with respect to a single object. (Author)

AD-641 511 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Colorado Univ., Boulder.
PERSONALITY DIFFERENCES IN DISSONANCE RESOLUTION.
Technical rept.,
by O. J. Harvey, and Robert Ware. Oct 66, 16p TR-18
Contract Nonr-1147 (07)

Descriptors: (*Personality, *Attitudes), Perception (Psychology), Behavior, Social psychology.

Identifiers: Cognitive dissonance.

Following the induction of either a positive or negative impression of an object person (OP) through descriptions of his past behavior, concrete and abstract Ss were presented descriptions of OP's present behavior that run counter to their past and wrote a two paragraph explanation of the perceived consistency-inconsistency. Concrete Ss, significantly more than abstract individuals, (1) perceived inconsistencies between OP's past and present behavior, (2) were negatively aroused by the inconsistency, (3) sought to neutralize the inconsistencies by attributing them to temporal change in OP's, (4) gave few explanations of the inconsistencies, (5) gave poorly integrated accounts of the inconsistencies, and (6) used stereotypic labels in their explanations. In addition, concrete Ss were significantly less tentative in their conclusions about the OPs and significantly more likely to view OP's possession of desirable and undesirable characteristics as mutually exclusive. (Author)

AD-641 558 **Field 5J**
Not available from CFSTI.
New York Univ., N. Y.
EFFECT OF ATTITUDE ON JUDGMENTS OF PLAUSIBILITY,
by Patricia Waly, and Stuart W. Cook. 23 Apr 64, 7p
Grant AF-AFOSR-436-63
Proj. AF-9778
Task 977802
AFOSR-66-1165
Availability: Published in Journal of Personality and Social Psychology v2 n5 p745-9 1966.

Descriptors: (*Social psychology, *Attitudes), Motivation, Psychometrics.

Ss were asked to rate the plausibility of 40 statements about segregation. Ss' own attitudes were measured by a self-report inventory. Hypotheses: (a) A statement will be considered a more plausible or effective argument by Ss who agree with the position which the statement supports than by Ss who disagree with that position. (b) Despite the difference in absolute rating of the arguments between judges with differing attitudes, they will agree on the relative plausibility of the various arguments supporting a given side of the issue. Both hypotheses were strongly supported. (Author)

AD-641 615 **Field 5J, 6A**
CFSTI Prices: HC$2.00 MF$0.50
Molecular Psychobiology Lab., York Univ., Toronto (Ontario).
MOLECULAR NEUROCHEMISTRY OF THE BRAIN DURING CONDITIONED AVOIDANCE BEHAVIOR.
Research rept.,
by John Gaito, James Mottin, Elizabeth Schaeffer, James Davison, and Joanne Rigler. 14 Oct 66, 38p MPL-4
Contract Nonr-4935 (00), Grant NRC-APB-110

Descriptors: (*Brain, Nucleic acids), (*Nucleic acids, *Learning), Conditioned reflex, Desoxyribonucleic acids, Ribonucleic acids, Behavior, Proteins, Labeled substances, Psychophysiology, Rats, Canada.

Four experiments were conducted to evaluate neurochemical changes in brain tissue of rats in a one way active avoidance conditioning task. The dependent variables were amounts of RNA, DNA, and proteins; ratios of these three; the specific activity of RNA, protein, and tissue pool fractions; and the relative specific activity of RNA and protein fractions. Lower amounts of labelled precursors were found in the tissue pool, RNA, and protein fractions in most brain tissues of learning animals than in control rats. The results concerning individual brain tissues suggested that the medial ventral cortex, and possibly the medial dorsal cortex, play an important role in this type of learning. (Author)

AD-641 623 **Field 5J, 5I**
Not available from CFSTI.
Kansas State Univ., Manhattan.
VERBAL CODING AND DISPLAY CODING IN THE ACQUISITION AND RETENTION OF TRACKING SKILL,
by Don Trumbo, Lynn Ulrich, and Merrill E. Noble. 29 Jul 64, 10p
Grant AF-AFOSR-526-64
Proj. AF-9778
Task 977801
AFOSR-66-1157
Availability: Published in Journal of Applied Psychology v49 n5 p368-75 1965.

Descriptors: (*Learning, Tracking), (*Tracking, Training), Display systems, Retention, Verbal behavior, Performance (Human).

One-hundred twenty Ss were trained on a pursuit tracking task with an irregular step-function input. Cues for coding the task were introduced via pretraining and rehearsal of a numerical code and by display overlays in a 2X2X3 design, 3 levels of specificity of cues were provided by the overlays with the most specific condition providing a numerical code like that of pretraining. The results showed that both pretraining and display coding facilitated early reduction of tracking error, but that neither these nor rehearsal of the numerical code affected retention performance after 1 week. Taken together, these findings suggested that the verbal and display cues were used in the early coding of the task, but were less important later in practice and at retention. (Author)

AD-641 624 **Field 5J**
CFSTI Prices: HC$3.00 MF$0.50
Indiana Univ., Bloomington.
DIFFERENTIAL REINFORCEMENT OF SEMANTICALLY CONDITIONED RESPONSES: TRANSFER EFFECTS DURING INTERROGATION.
Technical rept.,
by Norman Worrall, and Roger W. Russell. Nov 66, 58p TR-15
Contract Nonr-908 (15)

Descriptors: (*Conditioned reflex, Galvanic skin response), Reaction (Psychology), Audi-

tory signals, Tests, Transfer of training, Semantics.

Identifiers: Reinforcement (Psychology).

Differential semantic conditioning of somatic responses was studied in three experiments for its theoretical importance and for its practical possibilities in improving the detection of deception. The conditioned stimuli were the concepts of 'true' and 'false' respectively, while the unconditioned stimulus was a loud tone. The procedure was successful for the GSR in particular. Although confusional tactics were effective, their effectiveness was reduced by the conditioning procedure, which itself was effective only if the tone was loud. (Author)

AD-641 675 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Washington Univ., St. Louis, Mo. Dept. of Psychology.
SHIFTING AGREEMENT AND DISAGREEMENT IN DYADS UNDER CONDITIONS OF PERCEIVED DIFFERENCES IN TASK COMPETENCE.
Technical rept.,
by Richard H. Willis. Aug 66, 24p
Contract Nonr-816 (12)
Proj. NR-171-488

Descriptors: (*Behavior, Motivation), (*Group dynamics, Behavior), Perception (Psychology).

40 male and 40 female Ss were run in like-sexed dyads in 5 replications of a 2 x 2 x 4 orthogonal design. Independent variables were (a) sex of Ss, (b) direction of difference in perceived task competence, and (c) mode of partner behavior (Conformity, Independence, Anticonformity, Variability). A simulated interaction situation was used in which behavior of partners, as perceived by Ss, was manipulated along two dimensions of response to generate the four modes. Net Conformity and Independence scores were subjected to analysis of variance. Main results: (a) In all but one condition, the unidimensional Conformity-Independence model was applicable; (b) the main effect due to difference in perceived task competence was highly significant and in the expected direction; (c) the interaction between sex of Ss and mode of partner behavior, as measured by Net Conformity scores, was significant, with males and females exhibiting opposite reactions to anticonformity; and (d) the double-clustering of Ss' perceptions of partners, found in a previous experiment on the four modes of behavior but without differences in perceived competence, did not emerge with any consistency. (Author)

AD-641 699 **Field 5J, 6P**
CFSTI Prices: HC$1.00 MF$0.50
Harvard Univ., Boston, Mass. Medical School.
OPERANT ELECTRODERMAL CONDITIONING: SOME EFFECTS OF MULTIPLE SCHEDULES OF REINFORCEMENT.
Technical rept.,
by David Shapiro, and Andrew Crider. Nov 66, 13p TR-14
Contract Nonr-1866 (43)
Proj. NR-170-518

Descriptors: (*Conditioned reflex, *Autonomic nervous system), Skin, Reaction (Psychology), Electrophysiology, Blood circulation, Pulse rate, Reflexes, Psychophysiology.

Identifiers: Skin potential response, Reinforcement (Psychology).

The rate of emission of palmar skin potential responses in human subjects can be brought under the control of external stimuli correlated with different schedules of operant reinforcement. Successful discriminations are formed between reinforcement and nonreinforcement conditions, and differentia rates of response are observed by alternating the scheduling of intermittent reinforcement. (Author)

AD-641 703 **Field 5J**
Not available from CFSTI.
Antioch Coll., Yellow Springs, Ohio. Behavior Research Lab.
HUMAN AND ANIMAL VIGILANCE,
by Harry J. Jerison. 16 Aug 65, 7p
Grant AF-AFOSR-150-64
Proj. AF-9778
Task 977801
AFOSR-66-1191
Availability: Published in Perceptual and Motor Skills v21 p580-2 1965.

Descriptors: (*Attention, Monkeys), Humans, Decision making, Behavior, Monitors, Display systems.

Experiments with both men and monkeys, summarized in this report, indicate that vigilance decrements are associated with the ease or difficulty of observing. A given set of signals may be detected often or rarely by human observers, depending on how easy it is to watch the background of stimulus events within which signals can occur. (Author)

AD-641 813 **Field 5J, 5I, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Naval Personnel Research Activity, San Diego, Calif.
SEQUIN: A COMPUTERIZED ITEM SELECTION PROCEDURE.
Research rept.,
by William J. Moonan. Oct 66, 41p SRM-67-8
Proj. PF016050101

Descriptors: (*Test construction (Psychology), Analysis), (*Programming (Computers), Psychometrics), (*Naval personnel, Selection), Recruiting, Effectiveness, Functional analysis.

Identifiers: SEQUIN, Personnel screening tests.

The report describes a computerized item selection program called SEQUIN. The program can be used to determine if the number of items of a test can be reduced without practically reducing certain desirable psychometric properties of the test such as validity and internal consistency reliability. Applications of the program indicate that, in certain cases, the number of items can be substantially reduced with an increase in validity. This means then it is potentially very profitable to use such procedures as SEQUIN to analyze tests and testing programs. (Author)

AD-641 814 **Field 5J**
CFSTI Prices: HC$9.20 MF$2.75
Georgia Univ., Athens. Bioelectronic Computer Lab.
PSYCHOPHYSIOLOGIC VARIABLES AS INDICATIONS OF EMOTIONAL STRESS.
Final rept., Apr 64-Jul 65,
by Herbert Zimmer. Sep 66, 622p
Contract AF 30 (602)-3380
Proj. AF-5534
RADC-TR-65-296

Descriptors: (*Stress (Psychology), Psychometrics), Anxiety, Emotions, Motivation, Perception (Psychology), Psychophysiology, Cardiovascular system, Data processing systems, Electroencephalography.

The report covers the physiological responses of the human and means of achieving maximum discrimination between critical and neutral stimuli. Consideration is given to the social context in which the response is solicitated, the selection of the most useful psychophysiologic variable, methods of recording and analyzing the data by computers and the limits imposed by the existing knowledge. The appendix contains a rationale of those physiologic measures which have been employed by other investigations to study emotional reactions to stimuli of short duration. (Author)

AD-641 839 **Field 5J, 17B**
Not available from CFSTI.
Ohio State Univ., Research Foundation, Columbus.
THE EFFECT OF CONTEXT ON AURAL PERCEPTION OF WORDS,
by Gail Nygaard Traul, and John W. Black. 1 Apr 65, 8p Rept. no. 105
Contract Nonr-495 (18)
Projs. NR-145-993, RF-1002
Availability: Published in Journal of Speech and Hearing Research v8 n4 p364-9 Dec 1965.

Descriptors: (*Speech, *Intelligibility), (*Auditory perception, Language), Psychophysiology, Psychometrics.

Identifiers: Words.

Fifty words were selected for a study of intelligibility and disparity under five contexts. Each of the words was known to be relatively low in intelligibility and associated with a predominant error response. The 50 stimulus words were recorded in the five contexts: word in isolation, word spoken twice, word spoken along with its most frequent error response, and a warning to accept the first stimulus rather than the second, the word said midway in a group of words representing second-order word approximation, and the word said midway in a group of words representing third-order approximation. Both the intelligibility of the word and the disparity among the responses were affected by the context in which the word was presented, the single exception being that saying the word two times did not alter its intelligibility. (Author)

AD-641 891 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Bucknell Univ., Lewisburg, Pa.
FEAR OF FAILURE AND COGNITIVE CONTROLS.
Technical rept.,
by Lawrence K. Lundwall, and Richard C. Teevan. 1966, 31p TR-17
Contract Nonr-3591 (01)
Proj. NR-171-803

Descriptors: (*Fear, *Motivation), Reviews, Performance (Human), Control.

A review is given on studies and experiments on fear of failure and cognitive controls.

AD-641 989 **Field 5J, 15C**
CFSTI Prices: HC$3.00 MF$0.75
Simulmatics Corp., New York.
CRISIS LEVEL AND CIVIL DEFENSE ATTITUDES.
Final rept.,
by Samuel L. Popkin. May 66, 63p
Contract OCD-PS-64-17
Task 4813A

Descriptors: (*Attitudes, *Civil defense systems), Public opinion, Psychometrics, Analysis of variance, Warfare.

Comparative Survey analysis was used to relate public opinions about Civil Defense to the level of international tension. Twelve clusters of similar questions from national surveys taken between 1952 and 1964 were analyzed to determine if there were any significant variations between surveys that could be accounted for by changes in the level of international tension. Clusters most significantly related to the tension level were Imminence of War and Home Preparations for Attack. In general it is concluded that it often is more important to have high continuity between surveys in questions asked and to have high flexibility in the timing of surveys. (Author)

N66-33445 Field 5J
CFSTI Prices HC$1.00 MF$0.50
Massachusetts Inst. Of Tech., Cambridge.
RESEARCH IN PSYCHOBIOLOGY.
by R. Held, and H. L. Teuber. 1964, 9p NASA-CR-77064
Grant NSG-496

Descriptors: *Brain, *Human behavior, *Learning, *Perception, Animal, Behavior, Human, Nervous, Performance, Psychology, Psychomotor, Research, Sensory, System.

For abstract, see STAR 04 19.

N66-38705 Field 5J
CFSTI Prices HC$1.00 MF$0.50
Michigan Univ., Ann Arbor.
OPTIMAL LEARNING IN DETECTION SITUATIONS FIRST SEMIANNUAL STATUS REPORT, PERIOD ENDING JUN. 30, 1966.
by W. P. Tanner. 1966, 24p NASA-CR-78511
Contract NGR-23-005-159

Descriptors: *Human performance, *Learning, *Psychoacoustics, Adaptation, Detection, Noise, Optimal, Signal, Waveform.

For abstract, see STAR 04 23.

AD-463 787 See Field 15F

AD-50 619 See Field 5E

AD-641 317 See Field 6E

AD-641 331 See Field 6R

AD-641 352 See Field 6S

AD-641 418 See Field 6S

AD-641 423 See Field 5A

AD-641 524 See Field 6P

AD-641 525 See Field 6P

AD-641 580 See Field 5I

AD-641 581 See Field 5I

AD-641 582 See Field 5I

AD-641 583 See Field 5I

AD-641 584 See Field 5I

AD-641 585 See Field 5I

AD-641 586 See Field 5I

AD-641 587 See Field 5I

AD-641 652 See Field 5A

AD-641 671 See Field 6D

AD-641 794 See Field 6E

N66-33257 See Field 6A

PB-173 174 See Field 5E

PB-173 514 See Field 5G

5K. SOCIOLOGY

N66-34069 Field 5K
CFSTI Prices HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
ON LARGE MODELS OF SYSTEMS.
by C. W. Churchman. Jun 66, 22p NASA-CR-77105
Grant NSG-243-62
Presented At 2d Stony Brook Conf. On Advances In Computing, N. Y., Jun. 1966 Its Internal Working Paper No. 39

Descriptors: *Human behavior, *Mathematical model, *Operations research, *Sociology, Behavior, Government, Human, Industry, Mathematics, Model, Operation, Quantization, Research.

For abstract, see STAR 04 19.

AD-641 645 See Field 15C

AD-641 646 See Field 15C

6A. BIOCHEMISTRY

AD-641 425 Field 6A
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Frederick, Md.
ON THE EXISTENCE OF FREE RADICALS IN ENZYMATIC HYDROLYSIS OF ADENOSINE TRIPOSPHATE,
by O. N. Brzhevskaya, K. M. Lvov, and O. S. Nedelina. 23 Aug 65, 5p Trans-1640
TT-65-63080
Trans. of Biofizika (USSR) v9 n4 p500-1 1964.

Descriptors: (*Adenosine phosphates, *Free radicals), Muscle proteins, Hydrolysis, Phosphoric monoester hydrolases, Enzyme inhibitors, USSR.

An investigation of the influence of propyl gallate on the reaction of ATP-ase with myosin and with actomyosin demonstrated that inorganic phosphate evolution declined with increasing propyl gallate concentration. Evidence indicates, however, that propyl gallate is a nonspecific inhibitor. When diphenyl picryl hydrazyl is added to the system ATP-actinomyosin, its concentration is reduced in a manner which suggests the formation of free radicals during ATP hydrolysis.

AD-641 426 Field 6A
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Frederick, Md.
ULTRA-WEAK LUMINESCENCE AND OXIDATIVE PHOSPHORYLATION IN MITOCHONDRIA,
by Yu. A. Vladimirov, and O. F. Lvova. 23 Aug 65, 5p Trans-1641
TT-66-62549
Trans. of Biofizika (USSR) v9 n4 p406-7 1964.

Descriptors: (*Mitochondria, Luminescence), Phosphorylation, Oxidation, Tissues (Biology), Adenosine phosphates, USSR.

Luminescence was detected in the mitochondria of the liver of a rat, in which the process of oxidative phosphorylation had taken place. The mitochondria were isolated in 0.25 M saccharose at a pH of 7.4; their precipitation was carried out at 0--4 degrees, 8,000--10,000 g. It is concluded that bioluminescence is not an exotic phenomenon which is inherent to only individual representatives of the living world, but under specific conditions accompanies any oxidative phosphorylation, even in the tissues of higher animals, where nature, by means of energetic and structural barriers, does not permit the useless waste of valuable chemical energy for radiation. It is possible that the mechanism of participation of free radicals and electronic excited conditions may become more understandable when it is compared with the molecular mechanisms of bioluminescence.

AD-641 567 Field 6A
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
A PROCESS FOR THE CONTINUOUS FLOW, IN-LINE FRACTIONATION AND EXCHANGE OF VOLATILE SOLVENTS IN AUTOMATED CHEMISTRY.
Progress rept. 9 Mar-27 May 66,
by Marion J. Stansell, and Harry H. Malvin. Sep 66, 14p SAM-TR-66-83
Proj. AF-7755
Task 775505

Descriptors: (*Solvent extraction, Automatic), Vapors, Blood chemistry, Cholesterol, Blood serum, Fatty acid esters.

A process for the continuous flow, in-line fractionation, and exchange of volatile solvents is described. The approach is applicable to solvent systems containing no azeotropes, as well as to those possessing a minimum boiling azeotrope. The solvent mixtures are introduced to a heated, inclined, perforated conduit constructed from nonwettable material which is inert to the solvents of interest. As the fluid descends the heated conduit, a countercurrent stream of heated inert gas, saturated with the substance to be retained in the conduit, is passed over the perforations. The preferential evaporation of the more volatile fluid occurs, resulting in near complete removal of this component by the time the system exits at the bottom of the tube. The method is shown to be specifically applicable to the exchange of ethanolic potassium hydroxide for diethyl ether in the automated assay of serum glycerides and cholesterol. By manipulation of system parameters, the process can be applied to a wide variety of other solvent systems. (Author)

AD-641 572 Field 6A, 6T, 6F
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Medical Research Lab.
A MULTICHANNEL ANALYTICAL SYSTEM FOR CONTINUOUS MONITORING OF BLOOD CHOLINESTERASE.
Technical rept.,
by William A. Groff, L. A. Mounter, and Van M. Sim. Nov 66, 20p
Proj. DA-1C522301A079
EATR-4034

Descriptors: (*Cholinesterase, Blood chemistry), Blood plasma, Erythrocytes, Enzymes, Monitors, Toxicity, Cholinesterase inhibitors, Therapy, Organic phosphorus compounds, Diagnosis, Insecticides.

It is important to be able to follow changes in the levels of blood cholinesterases (ChE's) during organophosphate intoxication and therapy in order to correlate enzymic activities with clinical observation. Estimations of ChE activity in isolated blood samples have largely confirmed clinical observation and indicate the desirability of a continuous monitor of blood-ChE activity. This report describes a continuous, three-channel monitor for blood ChE that records plasma, erythrocyte, and whole-blood enzymic activity independently and concurrently. The procedure is based upon a modification of the Hestrin method, with the formation of colored ferric chloride-hydroxamate complexes derived from unhydrolyzed choline esters. By using acetylcholine, butyrylcholine, and acetyl-beta-methylcholine in a three-channel system, the responses of both plasma and erythrocyte enzymes can be followed. It is concluded that the utilization of specific substrates for plasma and erythrocyte enzymes permits a multichannel system to be used for the simultaneous monitor of blood ChE and the two individual components of its activity. This system can be applied to clinical studies of intoxication by anti-ChE agents and the response of the subject to therapy. (Author)

AD-641 573 Field 6A, 6P
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Medical Research Lab.
REGULATION OF GLYCOLYSIS IN TETANIZED CAT SKELETAL MUSCLE IN SITU.
Technical rept.,
by John E. Wilson, Bertram Sacktor, and Carvel G. Tiekert. Nov 66, 16p
Proj. DA-1C014501B71A02
EATR-4045

Descriptors: (*Glycolysis, *Musculoskeletal system), Control, Cats, Enzymes, Clostridium tetani, Toxins + antitoxins, Stimulation, Saccharide phosphates.

The effect of tetanic stimulation on the concentrations of metabolites in cat gastrocnemius muscle in situ was studied. Glucose-6-phosphate and fructose-6-phosphate accumulated as much as twenty-fold, whereas changes in other glycolytic intermediates were less marked. The level of creatine-phosphate decreased 50% in 30 sec of tetanus. The concentrations of high energy adenine nucleotides, ATP, ADP, and AMP, were constant. From changes in relative specific activities of the intracellular glucose and glucose-6-phosphate pools it was concluded that, during the greatly enhanced rate of metabolism concomitant with the stimulation, over 90% of the glucosyl-carbon entering glycolysis was derived from glycogen by the phosphorylase reaction. The findings are in accord with the view that the phosphorylase and phosphofructokinase reactions are the major loci of glycolytic control in mammalian skeletal muscle. The results specifically exclude a suggested rate-limiting role for the phosphohexose-isomerase reaction, which was found to be at, or near, equilibrium in the resting and the tetanic muscle, even through the glycolytic flux increased greatly during stimulation. (Author)

AD-641 751 **Field 6A**
CFSTI Prices: HC$1.60 MF$0.50
Army Biological Labs., Fort Detrick, Md.
EFFECT OF CALCIUM CHLORIDE AND MAGNESIUM SULFITE ON THE RATE OF RIGOR MORTIS,
by S. V. Osipova. Aug 64, 6p Trans-1179
TT-64-13921
Trans. of Byulleten Eksperimentalnoi Biologii i Meditsiny (USSR) v55 n5 p82-4 1963.

Descriptors: (*Calcium, Toxicity), (*Magnesium, Toxicity), Chlorides, Sulfites, Adenosine phosphates, Degradation, Biosynthesis, Musculoskeletal system, Rats, USSR.

Identifiers: Rigor mortis.

According to the data of recent biochemical investigations, three different adenosinetriphosphatases can be distinguished in the skeletal musculature: (1) myofibrillary, or actomyosinic, activated by the cations magnesium and calcium; (2) sarcoplasmic, which is activated by the cation magnesium and inhibited by the cation calcium; (3) mitochondrial, activated by the cation magnesium and not activated by the cation calcium. Calcium and magnesium ions can however act not only on the rate of utilization of energy-rich (macroergic) compounds, but also on the rate of their formation. Thus, calcium ions inducing swelling of mitochondria disengage respiration from the coupled phosphorylation, while magnesium ions counteract this disengaging effect of calcium ions. In addition, products of adenosinetriphosphoric acid breakdown, intensified due to stimulation of adenosinetriphosphatase by magnesium ions is a source of de novo formation of macroergs. The effect of toxic doses of calcium and magnesium salts on the rate of rigor mortis after decapitation of animals was investigated. This rate can serve as an index of the negative balance between the intensity of synthesis and the use of macroergic compounds. (Author)

AD-641 826 **Field 6A, 6O, 6T**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF HYDRAZINE ON FAT TRANSPORT AS AFFECTED BY BLOOD GLUCOSE CONCENTRATION,
by David L. Trout. 28 Dec 65, 10p SAM-TR-65-292
Proj. AF-7753
Task 775301
Availability: Published in Journal of Pharmacology and Experimental Therapeutics v152 n3 p529-34 1966.

Descriptors: (*Hydrazine, *Fatty acids), (*Glucose, Blood), Liver, Secretion, Fats, Transport properties.

In fasted rats, hydrazine (1.15-1.2 mmol/kg i.v., about 60% of the LD 50) elevates plasma free fatty acids (FFA), speeds the hepatic secretion of triglycerides into the blood plasma and within 3 hr almost doubles the quantity of liver total fatty acids. The present experiments were performed to ascertain the extent to which these effects are associated with a reduced concentration of blood glucose. The glucose-lowering effects of hydrazine was essentially avoided by feeding glucose or starch or by using fed animals. The FFA-elevating effectwas then greatly reduced, but was still observed unless the blood glucose exceeded 1.1 mg/ml. Since the effects of hydrazine on liver total fatty acids on the rate of triglyceride secretion into the blood could be largely prevented by maintaining the blood glucose level, it was concluded that these effects depend chiefly on plasma FFA concentration. (Author)

AD-641 831 **Field 6A, 6L**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Molecular Biology.
ULTRACENTRIFUGE STUDIES WITH ABSORPTION OPTICS. IV. MOLECULAR WEIGHT DETERMINATIONS AT THE MICROGRAM LEVEL,
by H. K. Schachman, and S. J. Edelstein. 6 Apr 66, 25p
Grants PHS-GM-12159, NSF-G-10795
Availability: Published in Biochemistry v5 n8 p2681-705 1966.

Descriptors: (*Ultracentrifuges, *Optical instruments), (*Molecular weight, Measurement), Optical scanning, Instrumentation, Recording systems, Sedimentation, Circuits, Serum albumin, Proteins, Separation, Transferases, Hemoglobin, Dissociation.

Recognition of the value of the absorption optical system for ultracentrifugal analysis has stimulated the development in recent years of an automatic split-beam photoelectric scanning optical system. This paper describes modifications in the instrument aimed at enhancing the linearity, sensitivity, and accuracy of the recording system. Numerous tests of the electronic circuits and optical system are described to illustrate the accuracy, linearity, and spectral range of the recording system for the absolute measurement of solute concentrations.

AD-641 910 **Field 6A, 14B, 6L**
CFSTI Prices: HC$1.00 MF$0.50
Naval Medical Research Inst., Bethesda, Md. Lab. of Physical Biochemistry.
AN ABSORPTION SPECTROPHOTOMETER CELL FOR USE AT HIGH PRESSURES AND ITS APPLICATION TO AN ENZYMIC REACTION.
Research rept.,
by Robert F. Steiner. 7 Nov 66, 16p
NAVMED-MR005.06.0001-32

Descriptors: (*Spectrophotometers, Containers), (*Enzymes, High-pressure research), (*Ultraviolet spectroscopy, Instrumentation), Absorption spectrum, Optical equipment components, Hydrolysis, Catalysis, Thrombin, Reaction kinetics, Deep submergence.

A cell designed for absorbancy measurements at high pressures has been constructed and used for a study of the pressure dependence of a thrombin-catalyzed hydrolysis. Thrombin is not inactivated at pressures up to 20,000 psi. The rate of hydrolysis of a synthetic substrate (toluene sulfonyl arginine methyl ester) increases appreciably with pressure. (Author)

AD-641 941 **Field 6A, 6C**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
ETHYLENE PRODUCTION FROM LINOLENIC ACID,
by F. B. Abeles. 1966, 6p
Availability: Published in Nature v210 n5031 p23-5 Apr 2 1966.

Descriptors: (*Plants (Botany), Ethylenes), (*Ethylenes, Biosynthesis), (*Linolenic acid, Metabolism), Fatty acids, Peroxides, Gas chromatography.

The possibility that the ethylene that is evolved from plants arises from linolenic acid was investigated by determining the relationship between ethylene evolution and linolenic acid levels from a number of plants. The evidence indicates that linolenic acid does not serve as a precursor of ethylene.

AD-642 001 **Field 6A**
Not available from CFSTI.
Naval Medical Research Inst., Bethesda, Md.
KINETICS AND MECHANISM OF ALBUMIN DENATURATION.
Interim rept.,
by Sam Katz, and Thomas G. Ferris. 1966, 7p
NAVMED-MR 005.20.0021.3
Availability: Published in Nature v211 n5049 p586-8 Aug 6 1966.

Descriptors: (*Serum albumin, Reaction kinetics), Electrophoresis, Urea, Proteins.

Identifiers: Denaturation.

The mechanism of urea denaturation of bovine serum albumin was studied utilizing acrylamide gel electrophoresis to differentiate protein subspecies. Results indicate that urea denaturation results in the production of several different kinds of protein subspecies which are time and urea concentration dependent and that the mechanism of urea, acid, alkali and heat denaturation are substantially different. (Author)

AD-642 005 **Field 6A**
Not available from CFSTI.
Army Biological Lab., Frederick, Md.
CHEMILUMINESCENCE OF LUMINOL IN THE PRESENCE OF HEMATIN COMPOUNDS,
by Harold A. Neufeld, Charles J. Conklin, and Richard D. Towner. 18 Feb 65, 7p
Availability: Published in Analytical Biochemistry v12 n2 p303-9 1965.

Descriptors: (*Chemiluminescence, Catalysis), (*Porphyrins, Microanalysis), Iron compounds, Complex compounds, Organic nitrogen compounds, Ketones, Hydrogen peroxide, Hemoglobin, Organic pigments, Proteins (Conjugated).

Identifiers: Cytochromes, Hematins, Ferritins, Luminol, Myoglobins.

A rapid and sensitive method has been described for the determination of micro amounts of hematin iron. The assay is based on the luminescence of alkaline luminol in the presence of hematin iron and hydrogen peroxide. The assay system employs the direct recording of the flash of light produced in the reaction with a Sanborn preamplifier and recorder. (Author)

N66-33173 **Field 6A**
CFSTI Prices HC$2.00 MF$0.50
Brandeis Univ., Waltham, Mass. Graduate Dept. Of Biochemistry.
STRUCTURAL AND FUNCTIONAL PROPERTIES OF THE H AND M SUBUNITS OF LACTIC DEHYDROGENASES.
by T. P. Fondy, and N. O. Kaplan. 1964, 31p
NASA-CR-59942
Grant NSG-375, Contract NIH-CA-03611
Submitted For Publication

Descriptors: *Enzyme, *Lactic acid, *Protein, *Tissue, Acid, Amino, Biochemistry, Composition, Cross section, Dehydrogenase, Functional, Heart, Immunology, Lactic, Muscle, Property, Stability, Structural, Temperature.

For abstract, see STAR 04 19.

N66-33257 **Field 6A, 5J**
CFSTI Prices HC$2.00 MF$0.50
Goteborg Univ. (Sweden). Inst. Of Neurobiology.
BIOCHEMISTRY OF CNS CELLS DURING LEARNING FINAL SCIENTIFIC REPORT, 1 APR. 1965 - 31 MAR. 1966.
by H. Hyden. 25 Apr 66, 46p AFOSR-66-0932, AD-633982
Contract AF-EOAR-65-53

Descriptors: *Biochemistry, *Central nervous system, Acid, Adenine, Brain, Cell, Central, Deoxyribonucleic acid (dna), Dna, Learning, Nervous, Protein, Ribonucleic, System, Training.

For abstract, see STAR 04 19.

N66-33374 **Field 6A**
CFSTI Prices HC$1.00 MF$0.50
Detroit Univ., Mich. Inst. Of Space Biophysics.
PORPHINE-LIKE SUBSTANCES. III - SYNTHESIS BY ELECTRICAL DISCHARGE.
by H. Radzilowski, and A. Szutka. 1964, 8p NASA-CR-60078
Grant NSG-226-62
Presented At The Natl. Acs Meeting, Detroit, 4-9 Apr. 1964

Descriptors: *Abiogenesis, *Electric discharge, *Organic chemistry, *Porphine, Aldehyde, Benzene, Biology, Chemistry, Compound, Discharge, Electric, Extraterrestrial, Life, Mixture, Organic, Pyrrole, Synthesis.

For abstract, see STAR 04 19.

N66-33376 **Field 6A**
CFSTI Prices HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
PRESENT STATUS OF THE AMINO ACID CODE.
by T. H. Jukes. 1964, 25p NASA-CR-59734
Grant NSG-479
Presented At The Ann. Meeting Of The Am. Dietetic Assoc., Portland, Oreg., 29 Jul. 1964 Submitted For Publication

Descriptors: *Biology, *Deoxyribonucleic acid (dna), *Genetic code, *Mutation, *Protein, Acid, Amino, Amino acid, Chemistry, Code, Composition, Genetics, Presence, Ribonucleic acid (rna), Sequence, Study, Synthesis.

For abstract, see STAR 04 19.

N66-33382 **Field 6A**
CFSTI Prices HC$3.00 MF$0.75
Brandeis Univ., Waltham, Mass. Graduate Dept. Of Biochemistry.
EVOLUTION OF DEHYDROGENASES.
by N. O. Kaplan. 1964, 74p NASA-CR-59967
Grant NSG-375
Submitted For Publication

Descriptors: *Biogenesis, *Biology, *Enzyme activity, Acid, Activity, Amino, Animal, Blood, Comparison, Dehydrogenase, Enzyme, Enzymology, Evolution, Human, Muscle, Physiology, Study.

For abstract, see STAR 04 19.

N66-33684 **Field 6A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
SEPARATION OF SIMPLE SUGARS ON CELLULOSE LAYERS.
Trennung Einfacher Zucker Auf Cellulose- Schichten
by A. Schweiger. Aug 66, 10p NASA-TT-F-10258
Transl. Into English From J. Chromatology, V 9, 1962 P 374-376

Descriptors: *Carbohydrate, *Cellulose, *Chemical analysis, *Organic compound, *Polysaccharide, Analysis, Chemical, Chromatography, Compound, Glucose, Hydrolysis, Organic, Product, Saccharide, Separation, Simple, Sugar.

For abstract, see STAR 04 19.

N66-37825 **Field 6A**
CFSTI Prices HC$5.00 MF$0.75
Stanford Univ., Calif. Instrumentation Research Lab.
A THEORY FOR MOLECULAR TRANSPORT PHENOMENA THROUGH THIN MEMBRANES.
by T. E. Lundstrom. May 65, 79p NASA-CR-67926, IRL-1034
Grant NSG-81-60

Descriptors: *Membrane theory, *Molecular diffusion, *Transport theory, Diffusion, Mathematics, Membrane, Molecular, Phenomenon, Relation, Solubility, Solute, Surface, Thin, Transport.

For abstract, see STAR 04 23.

N66-37894 **Field 6A**
CFSTI Prices HC$1.00 MF$0.50
Miami Univ., Coral Gables, Fla. Inst. For Molecular Evolution.
SIMULATION OF ORGANISMIC MORPHOLOGY AND BEHAVIOR BY SYNTHETIC POLY-ALPHA-AMINO ACIDS.
by S. W. Fox, D. Joseph, R. Mc cauley, C. R. Windsor, and S. Yuyama. 1965, 14p NASA-CR-78435
Grant NSG-689
Prepared Jointly With Fla. State Univ.

Descriptors: *Amino acid, *Behavior, *Morphology, *Simulation, Biology, Evolution, Organism, Polymer, Protein, Synthetic.

For abstract, see STAR 04 23.

N66-38368 **Field 6A, 6E**
CFSTI Prices HC$1.00 MF$0.50
Weizmann Inst. Of Science, Rehovoth (Israel). Biochemistry Section.
MECHANISM OF PHOTOPHOSPHORYLATION FINAL REPORT.
by M. Avron. 30 Apr 66, 10p AFOSR-66-1462, AD-636333
Contract AF-EOAR-64-19

Descriptors: *Organic phosphorus compound, *Phosphorylation, *Photosynthesis, Adenosine, Algae, Chloroplast, Enzyme, Oxidation, Phosphate, Photochemistry, Reaction, Reduction, Tracer.

For abstract, see STAR 04 23.

AD-641 427 **See Field 6E**

AD-641 615 **See Field 5J**

AD-641 871 **See Field 6P**

AD-641 993 **See Field 6M**

6B. BIOENGINEERING

N66-32925 **Field 6B**
CFSTI Prices HC$2.00 MF$0.50
Westinghouse Electric Corp., Pittsburgh, Pa. Bioengineering And Biosciences Technology
NASA CONTRIBUTIONS TO - CARDIOVASCULAR MONITORING.
by W. J. Jones, and W. C. Simpson. 1966, 48p NASA-SP-5041
Sponsored By Nasa

Descriptors: *Cardiovascular system, *Monitor, *Nasa program, Blood, Cardiovascular, Human, Measurement, Method, Oxygen, Physiology, Pressure, Pulse, Rate, Sensing, System.

For abstract, see STAR 04 19.

N66-33387 **Field 6B**
CFSTI Prices HC$2.00 MF$0.50
California Univ., Los Angeles.
SPECTRAL ANALYSIS TECHNIQUES AND PATTERN RECOGNITION METHODS FOR ELECTROENCEPHALOGRAPHIC DATA.
by W. R. Adey. 1966, 42p NASA-CR-77039
Grant NSG-502

Descriptors: *Automatic data processing system, *Electroencephalogram (eeg), *Pattern recognition, *Spectral analysis, Analysis, Automatic, Brain, Computer, Data, Discrimination, Eeg, Male, Model, Neurophysiology, Pattern, Processing, Recognition, Sleep, Spectral, System, Visual, Wakefulness.

For abstract, see STAR 04 19.

N66-33459 **Field 6B**
CFSTI Prices HC$2.00 MF$0.50
Westinghouse Electric Corp., Pittsburgh, Pa.
FLIGHT TYPE OXYGEN PARTIAL PRESSURE SENSOR.
by W. M. Hickam, and S. A. Sternbergh. Aug 66, 50p NASA-CR-534
Contract NAS1-4340

Descriptors: *Galvanic cell, *Oxygen sensor, *Pressure measurement, *Space capsule, Apparatus, Calcium, Capsule, Cell, Electrode, Electrolyte, Galvanic, High temperature, Measurement, Monitor, Oxide, Oxygen, Pressure, Sensor, Space, Zirconium.

For abstract, see STAR 04 19.

N66-38795 **Field 6B**
CFSTI Prices HC$2.00 MF$0.50
Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME I, PART 2 - INSTRUMENTATION.
by F. Larmie. 1966, 45p NASA-CR-66116, NSL-65-153, VOL. I, PT. 2
Contract NAS1-4449

Descriptors: *Instrumentation, *Lunar gravitation, *Physiological factor, Body, Channel, Condition, Equipment, Heart, Monitor, Pressurization, Rate, Respiration, Simulation, Suit, Temperature, Umbilical, Variable, Wire.

For abstract, see STAR 04 23.

N66-38796 **Field 6B**
CFSTI Prices HC$4.25 MF$2.00
Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME II, PART 1 - BIOMECHANICS RESEARCH PROGRAM.
by W. Kuehnegger. 1966, 379p NASA-CR-66117, NSL-65-153, VOL. II, PT. 1
Contract NAS1-4449

Descriptors: *Biomechanics, *Human performance, *Lunar gravitation, Analysis, Gravity, Lunar, Motion, Physical, Simulation, Work.

For abstract, see STAR 04 23.

N66-38797 **Field 6B**
CFSTI Prices HC$4.25 MF$2.00
Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME II, PART 2 - BIOMECHANICS RESEARCH PROGRAM APPENDICES.
by W. Kuehnegger. 1966, 363p NASA-CR-66118, NSL-65-153, VOL. II, PT. 2
Contract NAS1-4449

Descriptors: *Biomechanics, *Data acquisition, *Mathematical model, *Physical work, Camera, Computer, Gravity, Grid, Inertia, Locomotion, Lunar, Mathematics, Model, Performance, Pressure, Program, Simulator, Suit, System, Work.

For abstract, see STAR 04 23.

N66-38798 **Field 6B**
CFSTI Prices HC$4.25 MF$2.00
Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME III - WORK PHYSIOLOGY RESEARCH PROGRAM.
by W. Kuehnegger, H. P. Roth, and F. C. Thiede. 1966, 382p NASA-CR-66119, NSL-65-153, VOL. III
Contract NAS1-4449

Descriptors: *Biomechanics, *Lunar gravitational effect, *Physiological factor, *Space simulation, Body, Condition, Energy, Level, Locomotion, Metabolism, Parameter, Pressurization, Respiration, Stress, Suit, Task, Temperature, Tolerance, Work.

For abstract, see STAR 04 23.

N66-38799 **Field 6B**
CFSTI Prices HC$2.50 MF$0.50
Case Inst. Of Tech., Cleveland, Ohio. Engineering Design Center.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME IV - INVESTIGATION OF LUNAR GRAVITY SIMULATION TECHNIQUES.
by A. J. Bartley, R. P. Hess, R. J. Kirschensteiner, D. A. Millett, and R. J. Morgen. 1966, 55p NASA-CR-66120, NSL-65-153, VOL. IV
Contract NAS1-4449

Descriptors: *Lunar gravitational effect, *Physical factor, *Space simulator, Air, Capability, Ceiling, Condition, Energy, Friction, Harness, Magnetic, Pad, Plane, Resistance, Spring, Suspension, Vertical.

For abstract, see STAR 04 23.

6C. BIOLOGY

AD-641 416 **Field 6C, 2E**
Not available from CFSTI.
Army Medical Research Lab., Fort Knox, Ky. Pathology Div.
PANCREATIC FLUKES (EURYTREMA PROCYONIS) IN DOMESTIC CATS,
by Winslow G. Sheldon. 1960, 11p
DA-3A014501B71P
Task 10
USAMRL-663
Availability: Published in Journal of the American Veterinary Medical Association v148 n3 p251-3 Feb 1 1966.

Descriptors: (*Cats, *Trematodes), Pancreas, Parasites, Histology, Pathology.

Eurytrema procyonis was found in the pancreas of five of thirty-six cats from a two hundred and fifty mile radius of Fort Knox, Kentucky. The cats died of causes other than those which could be attributed to fluke infection. Gross and microscopic lesions produced by these trematodes were minimal. In each case, infection was limited to the pancreas. The flukes were present in the pancreatic ducts. There was increased amount of periductal connective tissue which in one instance encroached upon the adjacent acinar structure. A constant gross pathological finding was firm cord-like pancreatic ducts. (Author)

AD-641 421 **Field 6C**
Not available from CFSTI.
Narragansett Marine Lab., Univ. of Rhode Island, Kingston.
SOUND PRODUCTION IN THE AMERICAN LOBSTER, HOMARUS AMERICANUS H. MILNE EDWARDS (DECAPODA REPTANTIA).
Technical rept.,
by James F. Fish. 15 Nov 65, 6p TR-22, Ref-66-3
Contract Nonr-396 (11)
Proj. NR-083-054
Rept. on Biological Oceanography Project.
Availability: Published in Crustaceana v11 pt1 p105-6 1966.

Descriptors: (*Underwater sound, Crustacea), (*Crustacea, Sound), Muscles, Contraction, Frequency, Acoustic properties, Production.

Identifiers: Lobsters.

Of 100 American lobsters (Homarus americanus) examined, 25 produced sounds when grasped by the carapace. The sounds were produced internally by contraction of the muscles of the second antennae. Analyses of 25 sounds from six (3 males, 3 females) of the sound producing lobsters showed sustained tone durations of 0.1 to 0.5 seconds, fundamental frequencies of 100 to 130 Hz, and maximum sound pressure levels of 16 db above 1 microbar. (Author)

AD-641 424 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Frederick, Md.
OBSERVATIONS ON THE DEVELOPMENT CYCLE OF AEDES (F.) TOGOI UNDER LABORATORY AND NATURAL CONDITIONS,
by K. P. Chagin. Feb 66, 15p Trans-1939
TT-66-62547
Trans. of Meditsinskaya Parazitologiya i Parazitarnye Bolezni (USSR) v12 n2 p44-52 1943.

Descriptors: (*Aedes, Life cycle), Reproduction (Physiology), Eggs, Larvae, Females, Metamorphosis, Ecology, Temperature, Epidemiology, Periodic variations, Disease vectors, USSR.

Conclusions: Ae. (F.) togoi in the southern regions of Primorskoy Kray may yield the emergence of four generations, the last of which is incomplete. Out of some of the eggs laid by females of generation IV larvae develop, but their development does not reach the stage of emergence, and with the freezing of the reservoirs they die. Mosquitoes of generations III and IV have the greatest epidemiological importance. Under constant temperatures, the development of the water stages of Ae. (F.) togoi is possible to some degree within the limits of from 5 to 35-37 degrees. The optimum temperature for development is found within the limits of 24--27 degrees. With fluctuations in temperature the development is speeded up by 20% and the limit of the temperature optimum is expanded in the direction of a higher temperature; fluctuations reach an upper limit of 30--32 degrees. Under all conditions of observation a characteristic peculiarity is noted for Ae. (F.) togoi -- a great scattering in the periods of emergence of larvae from eggs of the same laying. This explains the lengthiness of the generations. In the first two generations a predominance of males is noted, but with generation III the females clearly predominate. The wintering of Ae. (F.) togoi in Primorskoy Kray takes place in the egg stage. Wintering is carried out mainly by the egg mases of mosquitoes from generations III and IV. (Author)

AD-641 487 **Field 6C**
Not available from CFSTI.
Stanford Univ., Calif. Dept. of Biological Sciences.
FUNCTIONAL ROLE OF MUSCLE RECEPTOR ORGANS IN CRAYFISH,
by Howard L. Fields, and Donald Kennedy. 1965, 11p
Grant AF-AFOSR-334-63
Proj. AF-9777
Task 977701
AFOSR-66-1132
See also AD-641 488.
Availability: Published in Nature v206 n4990 p1232-37 Jun 19 1965.

Descriptors: (*Crustacea, *Neuromuscular transmission), Abdomen, Muscles, End organs, Electrophysiology, Reflexes, Control, Inhibition, Nerve impulses, Nerve cells.

The abdominal stretch receptors of decaped crustaceans have been extensively analysed as to mechanisms of transduction and of excitatory and inhibitory control. Despite the thoroughness with which this organ has been examined as a receptor, little is known of its reflex function or of its central connections. Two types of experiments have been performed to elucidate the function of this proprioceptor in the reflex control of abdominal muscles in the crayfish. The first approach was to determine the innervation pattern of the extensor musculature. Glass microelectrodes were used to record junctional events in muscle fibers while the nerve trunk to the extensors was electrically stimulated with brief pulses of graded intensity. A more directly functional approach involved analysis of the central effects of stretch receptor output with all neural connections intact. In these experiments, receptor discharge was monitored with a fine platinum wire hooked under the dorsal nerve. Motoneurone discharge was simultaneously followed by monitoring junctional potentials in other extensor muscle fibers with an intracellular microelectrode. (Author)

AD-641 488 **Field 6C**
Not available from CFSTI.
Stanford Univ., Calif. Dept. of Biological Sciences.
REFLEX CONTROL OF ABDOMINAL FLEXOR MUSCLES IN THE CRAYFISH. II. THE TONIC SYSTEM,
by Donald Kennedy, and Kimihisa Takeda. 13 Jan 65, 20p
Grant AF-AFOSR-334-63
Proj. AF-9777
Task 977701
AFOSR-66-1133
See also AD-641 487.
Availability: Published in Journal of Experimental Biology v43 p229-46 1965.

Descriptors: (*Crustacea, *Neuromuscular transmission), Abdomen, Muscles, End organs, Electrophysiology, Reflexes, Control, Inhibition, Nerve impulses, Nerve cells.

The flexor musculature of the crayfish abdomen is divided into two systems; a set of tonic superficial muscles, and a complex series of massive flexor muscles that produce powerful twitches but never exhibit tonic contractions. The muscle types are histologically differentiated, and also separately innervated: the main flexors receive ten large motor axons, and the slow superficial muscles sim smaller ones. Impulses in the inhibitor axon, even at the optimal interval, reduce the amplitude of excitatory post-functional potentials by only a small amount; their effect in shortening duration is more notable. It is postulated that the peripheral inhibitor functions to cut short excitatory depolarizations and hence to terminate lingering tension

that might oppose subsequent reflex actions. (Author)

AD-641 656 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
EXPOSURE OF Tradescantia MICROSPORES TO PERIODIC VIBRATIONS OF 40-100 HERTZ,
by James C. Knepton, Jr., and Lynda J. Bales. 3 Oct 66, 25p NAMI-981
NAVMED-MR005.04-0032.2

Descriptors: (*Chromosomes, *Space biology), (*Plants (Botany), Vibration), Acceleration, Spores, Mutations, Mitosis, Growth.

Slight differences ($P<0.05$) were found in the number of spherical chromosomal fragments observed in the experimental and control groups of microspores, the greater number being among the experimentals. It was also observed that specimens vibrated for a short period (3 minutes) exhibited larger effects than those vibrated for longer periods of time (15-60 minutes). No significant impairments of the mitotic mechanism or growth disturbances were observed. Further experimentation is indicated in which Tradescantia microspores would be subjected to periodic and random vibrations of higher frequencies (100-2000 Hz) and accelerations (up to 110 g). (Author)

AD-641 728 **Field 6C**
Not available from CFSTI.
Columbia Univ., New York. Dept. of Neurology.
CLASSICAL CONDITIONING OF ELECTRIC ORGAN DISCHARGE RATE IN MORMYRIDS,
by Frank J. Mandriota, Robert L. Thompson, and M. V. L. Bennett. 17 Sep 65, 6p
Grant AF-AFOSR-550-64
Proj. AF-9777
Task 977701
AFOSR-66-0839
Availability: Published in Science v150 n3704 p1740-2 Dec 24 1965.

Descriptors: (*Fishes, *Conditioned reflex), Electric discharges, Frequency, Stimulation, Behavior.

Identifiers: Electric fish, Mormyridae.

Weakly electric fish of the African family Mormyridae emit pulses at variable intervals with a distribution skewed toward longer intervals. Fourteen specimens of the genera Mormyrops, Gnathonemus, and Marcusenius were classically conditioned to increase briefly their discharge frequency. The unconditioned stimulus was electric shock and the conditioned stimulus was light. These results are novel in that the overt conditioned response involves neither secretion nor movement. (Author)

AD-641 735 **Field 6C**
Not available from CFSTI.
Columbia Univ., New York. Coll. of Physicians and Surgeons.
THE FINE STRUCTURE OF THE SUPRAMEDULLARY NEURONS OF THE PUFFER WITH SPECIAL REFERENCE TO ENDOCELLULAR AND PERICELLULAR CAPILLARIES,
by Y. Nakajima, G. D. Pappas, and M. V. L. Bennett. 1965, 24p
Grants AF-AFOSR-550-64, PHS-NB-02314
Proj. AF-9777
Task 977701
AFOSR-66-1137
Availability: Published in American Journal of Anatomy v116 n3 p471-92 May 1965.

Descriptors: (*Fishes, Nerve cells), (*Nerve cells, Capillaries), Electron microscopy, Biological stains, Cell structure, Cytology.

Many capillaries are embedded in the cytoplasm of large supramedullary neurons (about 200 to 300 microns in diameter). Fewer such capillaries are seen in the smaller neurons (about 80 to 100 microns in diameter). The neuron clusters remain unstained after vital staining with trypan blue indicating presence of the blood-brain barrier. Electron microscopic studies show that the capillary lumen is lined by nonfenestrated endothelial cells, pericytes, and a continuous basement membrane. Glial cell processes consisting mostly of astrocytes abut onto the capillary basement membrane separating the capillary from the neuron. The continuous glial investment around blood vessels may play a role in maintenance of the blood-brain barrier. The nucleus in supramedullary cells is roughly circular and contains one large and several small nucleoli. The perikaryon contains neurofilaments, diffusely distributed elements of endoplasmic bodies, and inclusion bodies; but is devoid of elementary neurosecretory granules. The cell body of the neuron is entirely covered by glial cells, often with processes which deeply indent the soma surface. Neither synapses nor arborizing dendrites are found on the cell body. (Author)

AD-641 748 **Field 6C**
CFSTI Prices: HC$2.00 MF$0.50
Army Biological Labs., Frederick, Md.
THE PROBLEM OF FERTILIZATION IN IXODES TICKS,
by I. I. Sokolov. Jun 65, 28p Trans-1385
TT-66-62576
Trans. of Zoologicheskii Zhurnal (USSR), v35 n4 p511-28 1956.

Descriptors: (*Ticks, Reproduction (Physiology)), Life cycle, Reproductive system, Sex glands.

Identifiers: Copulation.

Contents include spermatophore fertilization, movement of the spermia, and the fate of spermia in the oviducts.

AD-641 750 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Frederick, Md.
CATHODE LUMINESCENCE OF NORMAL AND CANCEROUS CELLS,
by V. S. Pyatenko, and B. N. Tarusov. 12 Aug 65, 7p Trans-1642
TT-66-62578
Biofizika (USSR), v9 p134-5 1964.

Descriptors: (*Cancer, Tissue culture cells), (*Tissue culture cells, Luminescence), Antioxidants, Diagnosis, USSR.

A method was developed for determining the antioxidative effect in culture cells and cells prepared by means of the trypsinization of animal tissues, based on the dying out of luminescence which accompanies the free radical processes at the cathode during the passage of direct current with a density of 200 ma/sq cm through a suspension of cells. It was established that cancerous cells, prepared by means of trypsinization of cancer of the stomach and cancer of the mammary glands, and also culture cells of a cancerous origin: Hela, Hep-2, CaPa, CaMa -- lose luminescence more intensively than normal cells, prepared by trypsinization of monkey kidneys, lungs of a 3--5 month old human embryo, and 9-day chick embryos. Based on their antioxidative effect, the culture cells of non-cancerous origin (sots, strain 580, cells from an upper limb of a 3-month old human embryo) approximate those of cancerous cells (Hela, Hep-2, and others). (Author)

AD-641 924 **Field 6C**
Not available from CFSTI.
Walter Reed Army Inst. of Research, Washington, D. C.
THE ORIGIN, COURSE AND TERMINATION OF CORTICOSPINAL FIBERS IN THE SLOW LORIS, NYCTICEBUS COUCANG (BODDAERT),
by C. Boyd, G. Campbell, David Yashon, and John A. Jane. 1966, 12p
Prepared in cooperation with Presbyterian-St. Luke's Hospital, Chicago, Ill., Illinois Coll. of Medicine, Chicago, and Lincoln Park Zoological Gardens, Chicago, Ill.
The Journal of Comparative Neurology v127 n1 p101-12 May 1966.

Descriptors: (*Primates, Nervous system), Nerve fibers, Brain, Spinal cord, Electrophysiology, Cerebral cortex, Degradation, Anatomy, Neurology, Physiology.

The origin and distribution of corticospinal fibers in the slow loris (Nycticebus coucang) were studied with the aid of the Nauta-Gygax technique following selected ablations of portions of the left cerebral cortex. Reconstruction of the cortical area which contributes to the corticospinal tract reveals a 'motor' area which approximates that of Perodicticus, another lorisiform lemur, mapped by electrophysiological methods. Degenerated corticospinal fibers found in the contralateral lateral funiculus were traced caudally to sacral segments. A small number of degenerated fibers were also found in the ipsilateral lateral funiculus as far caudally as the lumbar cord. Preterminal fiber degeneration was most abundant in the contralateral dorsal horn and zona intermedia. Similar, but less abundant, degeneration was found in the contralateral ventral horn. Some degenerating fibers recrossed through the dorsal and ventral gray commissures to the ipsilateral gray matter where preterminal fiber degeneration was most abundant in the medial portions of the ventral horn. Degenerating corticospinal fibers could be seen among the large, laterally-placed cells of the contralateral ventral horn. (Author)

N66-33417 **Field 6C**
CFSTI Prices HC$1.00 MF$0.50
California Univ., Los Angeles. Space Biology Lab.
RECORDING LEAF MOVEMENTS WITH A STRAIN GAUGE.
by T. Hoshizaki, and K. Yokoyama. 1964, 10p
NASA-CR-59801
Grant NSG-528, Contract AF-AFOSR-246-63
Submitted For Publication

Descriptors: *Electronic recording instrument, *Lightweight, *Plant (biol), *Strain gauge, Circadian, Electronic, Environment, Gauge, Instrument, Leaf, Movement, Recording, Sensor, Space, Strain, Testing, Unit.

For abstract, see STAR 04 19.

N66-33764 **Field 6C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
CHANGES IN APPETITE FOR WATER, GLUCOSE, SODIUM, AND POTASSIUM IN RATS WHEN THE SODIUM PUMP IS INHIBITED BY STROPHANTHIN- K.
Izmeneniya Appetita K Vode, Glyukoze, Natriyu I Kaliyu U Krys Pri Ugnetenii Natriyevogo Nasosa Vvedeniyem Strofantina K
by G. M. Roshchina, and A. M. Ugolev. Jun 66, 9p NASA-TT-F-10200
Transl. Into English From Dokl. Akad. Nauk Sssr (Moscow), V. 165, No. 5, 1965 P 1211-1214

Descriptors: *Glucose, *Potassium, *Rat, *Sodium, *Water, Animal, Appetite, Biology, Blood, Chloride, Consumption, Pump, Salt, Study.

For abstract, see STAR 04 19.

N66-38793 **Field 6C**
CFSTI Prices HC$1.00 MF$0.50
Naval School Of Aviation Medicine, Pensacola, Fla. Naval Aviation Medical Center.
THE ELECTROENCEPHALOGRAM OF THE SQUIRREL MONKEY (SAIMIRI SCIUREUS) IN A VERY HIGH MAGNETIC FIELD.

by D. E. Beischer, and J. C. Knepton Jr. 9 Jun 66, 21p NASA-CR-78660, NAMI-972
NASA ORDER R-39

Descriptors: *Electroencephalogram (eeg), *Magnetic field, *Monkey, Animal, Cerebral, Effect, Function, Laboratory, Nervous, Squirrel, Study, System, Very high.

For abstract, see STAR 04 23.

AD-641 331 See Field 6R

AD-641 835 See Field 6E

AD-641 836 See Field 6E

AD-641 845 See Field 12A

AD-641 936 See Field 6M

AD-641 941 See Field 6A

N66-38228 See Field 6P

6D. BIONICS

AD-236 885 **Field 6D, 9B**
CFSTI Price: HC$8.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
HEURISTIC ASPECTS OF THE ARTIFICIAL INTELLIGENCE PROBLEM.
Group rept.,
by M. L. Minsky. 17 Dec 56, 90p GR-34-55
Contract AF 19 (122)-458

Descriptors: (*Artificial intelligence, Machines), Design, Computers, Analysis, Data processing systems, Theory.

A discussion is given from a heuristic point of view, some of the problems encountered in the design of what might be called 'intelligent' machines.

AD-443 844 **Field 6D, 9B**
CFSTI Price: HC$10.60
Stanford Electronics Labs., Stanford Univ., Calif.
STATISTICAL ANALYSIS OF ADAPTIVE LINEAR CLASSIFIERS,
by G. F. Groner. Apr 64, 105p Technical repts.
SU-SEL-64-026, TR-6751-1
Contract DA-04-200-AMC-57 (Z)

Descriptors: (*Pattern recognition, Optimization), (*Classification, Statistical analysis), (*Adaptive control systems, Classification), Linear systems, Data processing systems, Networks, Design, Computers, Decision making, Sampling, Sequential analysis, Measurement, Automata.

Contents note: The pattern-recognition problem: An adaptive threshold element; Fundamentals of statistical decision theory: A statistical description of the characteristics of an adaptive threshold element; The use of the patterns; Networks of adalines; Some experiments with various classifiers; The preprocessor as a measurement selector; The preprocessor as a quantizer; and Some experiments with various preprocessors.

AD-641 671 **Field 6D, 5G, 5J**
CFSTI Prices: HC$6.00 MF$1.25
Bolt, Beranek and Newman, Inc., Cambridge, Mass.
SEMANTIC MEMORY,
by M. Ross Quinlan. Oct 66, 233p Scientific-2
Contract AF 19 (628)-5065, ARPA Order-627
Proj. AF-8668
AFCRL-66-189

Descriptors: (*Semantics, *Memory), (*Cybernetics, Memory), Simulation, Computers, Linguistics, Syntax, Information retrieval, Computational linguistics.

The report describes a model for the general structure of human long term memory. In this model, information about such things as the meanings of words is stored in a complex network, which then displays some of the desirable properties of a human's semantic memory. Most important of these properties is the capability of the memory to be used inferentially; i.e., to allow for the answering of questions besides those specifically anticipated at the time the information is stored in the memory. A computer program is described which illustrates this property by using the memory model inferentially to simulate human performance on a basic semantic task. When the meaning of some segment of natural language text is represented in the format of the model, relationships and features of this meaning must be made explicit which were not explicit in the text itself. This becomes a methodological advantage in an experiment in which a person interprets text, as described. (Author)

AD-641 647 See Field 9B

6E. CLINICAL MEDICINE

AD-641 316 **Field 6E**
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y. Research Div.
REPORT OF THE QUESTIONNAIRE STUDY OF 69 LIMB MAKERS AND LIMB FITTERS.
Technical rept.,
by Aaron Stern. 1949, 50p
Contract N6ONR-279 (01)
Projs. 80, SDC-9-D-1
SPECDEVCEN-279-1-09
See also AD-641 317, AD-641 318, AD-641 319.

Descriptors: (*Artificial limbs, Design), (*Prosthetics, Public opinion), Amputees, Amputation stumps, Surgical techniques, Therapy, Rehabilitation, Training, Sampling, Attitudes.

In conducting research on the problems of the above-the-knee amputees, information was sought from all groups who have had experience in this field. The opinions, attitudes, and experiences of these various groups were surveyed in an integrated fashion. Questionnaires were sent to a nationwide sampling of above-the-knee amputees; to orthopedic surgeons who have specialized in the field of above-the-knee amputations, and to members of the limb making profession. This report deals with the results of the study performed with the cooperation of members of the limb making group.

AD-641 317 **Field 6E, 5J**
CFSTI Prices: HC$6.00 MF$1.25
New York Univ., N. Y. Research Div.
REPORT OF INTENSIVE INVESTIGATIONS OF THE PERSONALITY CHARACTERISTICS OF FORTY EIGHT ABOVE-THE-KNEE AMPUTEES.
Technical rept.,
by Lawrence Edwin Abt. 1949, 248p
Contract N6ONR-279 (01)
Projs. 80, SDC-9-D-1
SPECDEVCEN-279-1-11
See also AD-641 316, AD-641 318, AD-641 319.

Descriptors: (*Amputees, Adjustment (Psychology)), Attitudes, Personality, Prosthetics, Artificial limbs, Psychometrics, Statistical analysis, Sampling, Projective techniques.

The report presents the results of a study of the psychological adjustment problems of a group of forty-eight above-the-knee leg amputees who reside in the Metropolitan New York Area, and gives special attention to their adjustment problems with prosthetic devices. All of the subjects are veterans of World War II, and each sustained the loss of his limb as a result of combat experience with one of the military services. The research study is concerned particularly with an evaluation of the role of psychological factors -- attitudes and opinions, hopes and aspirations -- as they may affect adjustment to a prosthesis. (Author)

AD-641 318 **Field 6E**
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y. Research Div.
PROBLEMS IN THE FITTING AND SERVICING OF PROSTHETIC DEVICES FOR ABOVE-THE-KNEE AMPUTEES.
Technical rept.,
by Aaron Stern. 1949, 30p
Contract N6ONR-279 (01)
Projs. 80, SDC-9-D-1
SPECDEVCEN-279-1-12
See also AD-641 316, AD-641 317, AD-641 319.

Descriptors: (*Artificial limbs, Design), (*Prosthetics, Public opinion), (*Amputees, Adjustment (Psychology)), Surgical techniques, Rehabilitation, Amputation stumps, Attitudes.

The purpose of the report is to compare the responses obtained from the amputee, limb-maker, and surgeon groups which participated in the questionnaire studies dealing with the engineering, psychological, medical, and limb-fitting factors involved in above-the-knee amputation. An attempt is made in this report to assemble the data obtained from amputees, orthopedic surgeons, and limb-makers and limb-fitters.

AD-641 319 **Field 6E**
CFSTI Prices: HC$5.00 MF$1.00
New York Univ., N. Y. Research Div.
INVESTIGATIONS WITH RESPECT TO THE DESIGN, CONSTRUCTION, AND EVALUATION OF PROSTHETIC DEVICES. VOL. I.
Technical rept.,
by Renato Contini. 1949, 163p
Contract N60NR-279 (01)
Projs. 80, SDC-9-D-1
SPECDEVCEN-279-1-10
See also AD-641 316, AD-641 317, AD-641 318.

Descriptors: (*Artificial limbs, Design), Amputees, Rehabilitation, Training, Attitudes, Prosthetics, Test equipment, Test methods.

CONTENTS: Force Plate Studies: Electronic System; Control System; Calibration; Test Procedure; Evaluation of Data; Force Plate Results; Force Plate and Stick Diagram Analysis of Walking with Prostheses; Load Survey. Variable Knee Studies: Model Description; Test Program; Test Results. Rotary Hydraulic Damper: Development of the Study; Theoretical Derivations; Description of Test Models; Description of Test Equipment and Procedures; Tabulated and Plotted Data; Sample Calculation and Discussion of Results.

AD-641 375 **Field 6E**
Not available from CFSTI.
California Univ., Los Angeles. School of Medicine.
MEASUREMENT OF OXYGEN TENSION AND SATURATION IN THE DIAGNOSIS OF RENAL ISCHEMIC HYPERTENSION,
by A. T. K. Cockett, D. R. Cannon, C. K. Liu, and R. T. Kado. 1965, 4p
Grant AF-AFOSR-246-63
Proj. AF-7164
Task 716402
AFOSR-66-1417
Presented at the Southern California Chapter of the American College of Surgeons, Palm Springs, Calif., Jan 24, 1965.
Availability: Published in The American Surgeon v31 n10 p691-3 Oct 1965.

Descriptors: (*Oxygen consumption, *Kidneys), Urinary system, Diseases, Diagnosis, Arteries, Blood.

Oxygen tension and oxygen saturation data have been obtained in three groups of patients undergoing renovascular or renal surgery. In normal kidneys the oxygen saturation and oxygen tension in the renal vein blood are 90 to 97 per cent and 80 to 113 mm. Hg, respectively. In renal ischemia the oxygen saturation in the affected renal vein is 60 to 75 per cent. Oxygen tension is about 60 to 75 mm. Hg. In other types of patients with intrinsic renal disease, including chronic pyelonephritis, the oxygen tension and oxygen saturation are less predictable. (Author)

AD-641 376 **Field 6E**
Not available from CFSTI.
California Univ., Los Angeles. School of Medicine.
URINARY LACTIC ACID DEHYDROGENASE ACTIVITY IN THE DIAGNOSIS OF UROLOGIC NEOPLASMS,
by David A. Lee, Abraham T. K. Cockett, Barry M. Caplan, and Neil Chiamori. 4 Mar 65, 5p
Grant AF-AFOSR-246-63
Proj. AF-7164
Task 716402
AFOSR-66-1139
Prepared in cooperation with Harbor General Hospital, Torrance, and Wadsworth Veterans Administration Hospital, Los Angeles, Calif. Prepared for presentation at Southern California Chapter, American College of Surgeons, Palm Springs, California, January 22-24, 1965.
Availability: Published in The Journal of Urology v95 p77-8 Jan 1966.

Descriptors: (*Neoplasms, Diagnosis), (*Urinary system, Neoplasms), Oxidoreductases, Urine.

Determination of the levels of urinary LDH is a useful diagnostic tool in differentiating benign vs. malignant lesions in the urinary tract. In the absence of pyuria an elevated level is probably diagnostic of neoplasms while a normal level, as in many other laboratory studies, seems to have less significance. Diagnosis is usually not made on the basis of a single physical finding, or on the basis of a single laboratory examination, but urinary LDH appears to be a simple, valuable test to be used in the differential determination of suspicious urogential lesions. (Author)

AD-641 377 **Field 6E**
Not available from CFSTI.
California Univ., Los Angeles. School of Medicine.
SIGNIFICANCE OF ANTIBACTERIAL LEVELS IN THE RENAL LYMPH DURING TREATMENT FOR PYELONEPHRITIS,
by Abraham T. K. Cockett, Alan P. Roberts, and R. Moore. 17 Jun 65, 8p
Grants AF-AFOSR-246-63, PHS-HE-09834-01
Proj. AF-7164
Task 716402
AFOSR-66-0852
Prepared for presentation at the annual meeting of American Urological Association, Inc., New Orleans, Louisiana, May 10-13, 1965. Prepared in cooperation with Harbor General Hospital, Los Angeles, Calif.
Availability: Published in The Journal of Urology v95 p164-8 Feb 1966.

Descriptors: (*Urinary system, Diseases), (*Kidneys, Antibiotics), (*Lymph, Kidneys), (*Antibiotics, Lymph), Lymphatic system, Effectiveness, Chemotherapeutic agents.

A method for the cannulation of renal lymphatics is described. A 2 to 3-fold increase in lymph concentrations of nitrofurantoin over plasma is observed 1 1/2 to 2 hours after infusion by gastric tube. Microbiological activity against E. coli is seen in the renal lymph. Maximal activity is present at 1 1/2 to 2 hours. The hilar lymphatics are also cannulated. It would appear that these vessels draining the medulla contain a still higher concentration of the antibacterial. Chloramphenicol levels in plasma exceed renal lymph concentrations by several fold. Antimicrobial activity of chloramphenicol in lymph is demonstrated. Antimicrobial assay of renal lymph along with urine and blood levels is indicated to determine the effectiveness of any therapeutic agent. This new dimension -- renal lymph -- has been overlooked in the past. (Author)

AD-641 378 **Field 6E**
Not available from CFSTI.
California Univ., Los Angeles. School of Medicine.
THE ROLE OF ARTERIAL PULSATION IN EXPERIMENTAL HYDRONEPHROSIS,
by Abraham T. K. Cockett, R. M. Nakamura, and B. I. Rein. 27 Oct 64, 9p
Grant AF-AFOSR-246-63
Proj. AF-7164
AFOSR-66-1891
Prepared in cooperation with Harbor General Hospital, Torrance, Calif.
Availability: Published in Investigative Urology v2 n6 p548-54 1966.

Descriptors: (*Urinary system, Obstruction (Physiology)), Arteries, Kidneys, Diseases, Etiology, Histology, Pathology.

A method for the development of chronic experimental hydronephrosis is outlined. Histologic changes in the ureters and kidneys associated with hydronephrosis are listed. It would appear that two factors, partial ureteral obstruction and the arterial pulse, are important in the genesis of hydronephrosis. Partial ureteral obstruction alone is less predictable. (Author)

AD-641 380 **Field 6E**
Not available from CFSTI.
California Univ., Los Angeles. School of Medicine.
TRANSPORT OF RENIN ANGIOTENSIN BY RENAL LYMPHATICS.
Interim rept.,
by Abraham T. K. Cockett, Raymond S. Moore, and Ray T. Kado. 1965, 3p
Grant AF-AFOSR-246-63
Proj. AF-7164
Task 716402
AFOSR-66-0854
Availability: Published in Surgical Forum, American College of Surgeons v16 p492-3 1965.

Descriptors: (*Kidneys, *Lymph), (*Vasoactive agents, Lymph), Lymphatic system, Biological assay.

Identifiers: Angiotensins.

Controversy exists regarding the role of the renal lymphatics in transporting renin angiotensin. Significance to this accessory system has not been ascribed while renin activity in renal lymph and thoracic duct lymph has been found. The purpose of the study was to determine renin angiotensin levels simultaneously in renal capsular lymph or renal hilar lymph, and renal vein plasma under normal conditions. (Author)

AD-641 427 **Field 6E, 6A, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Frederick, Md.
EFFECT OF PLAGUE TOXIN ON BLOOD PROTEINS AND INCORPORATION OF METHIONINE-S35 INTO TISSUE PROTEINS,
by I. V. Domaradskii, I. M. Klimova, and A. A. Tokareva. Dec 65, 13p Trans-1712
TT-66-62550
Trans. of Voprosy Meditsinskoi Khimii (USSR) v7 n5 p614-9 Nov-Dec 1961.

Descriptors: (*Blood proteins, Biosynthesis), (*Pasteurella pestis, Toxins ; antitoxins), (*Toxins + antitoxins, Blood proteins), Mice, Guinea pigs, Serum albumin, Globulins, Toxicity, Blood serum, Methionine, Tissues (Biology), Dosage, USSR.

In white mice plague microbe toxin disrupts the ratio between the protein fractions of the blood serum. There is a decrease in the content of albumins and an increase in the concentration of globulins. However, it is difficult to say due to which fraction of globulins the lowering of the albumin-globulin coefficient takes place. The stated changes have a stable nature and are detected in surviving animals even after 3 days following the administration of toxin to them. During plague intoxication the total amount of protein is not changed. The influence of the toxin on the blood serum proteins of guinea pigs is doubtful. Plague intoxication changes the rate of incorporation of Methionine-S35 into the blood proteins of white mice and does not influence the rate of incorporation of methionine-S35 into the blood proteins of guinea pigs and the tissue proteins of both species of animals. (Author)

AD-641 794 **Field 6E, 6T, 6O, 5J K**
CFSTI Prices: HC$5.00 MF$1.00
Arctic Aeromedical Lab., For Wainwright, Alaska.
RESEARCH OF THE SCIENTIFIC LITERATURE AND REPORTS ON THE EFFECTS OF MAN OF ALCOHOL ALONE AND IN COMBINATION WITH OTHER DRUGS.
Final rept. May 62-May 63,
by C. H. Hine, and Henry W. Turkel. Jul 66, 167p
AAL-TR-63-22
Proj. AF-8241
Task 824133

Descriptors: (*Alcohols, Toxicity), Pharmacology, Physiology, Psychology, Addiction, Social sciences, Law, Criminology, Behavior, Ingestion (Physiology), Central nervous system, Environment, Therapy, Laboratory animals, Humans, Reviews.

The review of medical and scientific literature was undertaken to establish what knowledge was existent regarding effects of alcohol and other drugs in the presence of reduced environmental temperatures on the behavior of animals and man. The gathering, classifying, and reviewing of this literature was necessary to determine whether further work should be done in this area. The paramount problem was to determine whether reduced environmental temperatures such as might be expected in environments in which Air Force personnel would be operating in their world-wide mission were a factor which should be considered in predicting behavior, following the ingestion of alcohol, taking of drugs or exposure to other agents which might have effects on the central nervous system. This review was accomplished in part by direct reference to journals dealing with the action of drugs and environmental agents, and in part by reference to standard abstracting sources. Special attention was paid to material appearing in the Quarterly Journal of Studies on Alcohol. Special attention was directed toward the pharmacology, physiology, effects on the nervous system, and behavior following acute or repeated intake of alcohol. Practically no information was available concerning the effect of the environment, drugs and chemicals, especially as regards reduced temperatures. (Author)

AD-641 834 **Field 6E**
Not available from CFSTI.
Armed Forces Inst. of Pathology, Washington, D. C. Dept. of Ophthalmic Pathology.
UNSUSPECTED RETINOBLASTOMA: ENUCLEATION IN AN 11-YEAR OLD GIRL FOLLOWING INJURY AND PANOPHTHALMITIS,
by Abbott G. Spaulding, and Gottfried Naumann. 24 May 66, 6p
Supported in part by PHS. Rept. on Clinicopathologic Case Reports.
Availability: Published in Arch Ophthal v76 p575-7 Oct 1966.

Descriptors: (*Retina, Neoplasms), Pathology, Eye, Wounds + injuries, Histology, Children.

A case of unsuspected retinoblastoma is reported. An eye was enucleated from an 11-year-old child because of panophthalmitis following corneal injury. Keratomycosis was also present. The case points out the rare occurrence of acute trauma leading to the recognition of retinoblastoma. (Author)

AD-641 835 **Field 6E, 6C**
Not available from CFSTI.
Lobund Lab., Univ. of Notre Dame, Ind.
LYMPHOCYTOPOIESIS, PLASMACYTOPOIESIS AND CELLULAR PROLIFERATION IN NONANTIGENICALLY STIMULATED GERMFREE MICE.
Doctoral thesis,
by George B. Olson, and Bernard S. Wostmann.
1 Feb 66, 9p
Grant NSF-GB-1105
Supported in part by ONR and PHS.
Availability: Published in The Journal of Immunology v97 n2 p267-74 (1966).

Descriptors: (*Lymphocytes, *Germ-free animals), (*Antigens + antibodies, Biosynthesis), (*Immunology, Germ-free animals), Mice, Thymidines, Labeled substances, Tritiated compounds, Hemopoietic system, Stimulation, Reticulo-endothelial system, In vivo analysis.

Quantitative evaluation of lymphocytopoiesis and plasmacytopoiesis in various lymph nodes of germfree and conv mice show the conv animals have about 3 times (% basis) or 12 times (absolute basis determined from mesenteric lymph nodes) more blast and potential antibody producing cells than their germfree counterparts. Other cellular aspects such as cell distribution within respective lymph nodes and proliferation rate of lymphoid cells are not affected by the animal's germfree status. Two hours after tritiated thymidine (TH3) pulse labelling, the nodes of the conv mice contained more labelled cells per 1000 cells than the respective nodes of germfree mice. Evidence suggests this difference was due to a smaller quantity of less differentiated cells and to a restriction of TH3 label movement in nodes of germfree mice. Cells which became labelled incorporated the TH3 to the same extent in both germfree and conv mice. (Author)

AD-641 836 **Field 6E, 6C**
Not available from CFSTI.
Lobund Lab., Univ. of Notre Dame, Ind.
CELLULAR AND HUMORAL IMMUNE RESPONSE OF GERMFREE MICE STIMULATED WITH 7S HGG OR SALMONELLA TYPHIMURIUM.
Doctoral thesis,
by George B. Olson, and Bernard S. Wostmann.
1 Feb 66, 13p
Grant NSF-GB-1105
Supported in part by PHS and ONR.
Availability: Published in The Journal of Immunology v97 n2 p275-86 (1966).

Descriptors: (*Immunology, Germ-free animals), (*Germ-free animals, Salmonella), (*Antigens + antibodies, Biosynthesis), Lymphocytes, Immunity, Vaccines, Mice, Hemopoietic system, In vivo analysis, Reticulo-endothelial system.

Germfree mice stimulated with either 7S HGG or Salmonella typhimurium vaccine react in a manner comparable to that of their conv counterparts. In each case the proliferation time of lymphoid cells was reduced from 21 to 22 hr in nonstimulated mice to 17 to 20 hr or 8 to 13 hr in mice stimulated with 7S HGG or S. typhimurium, respectively. Plasmacytopoiesis and hyperplasia was more pronounced in both groups when they were stimulated with the bacterial antigen. Plasmacytic cells, blast cells and large lymphocytes showed a proportionately greater increase in germfree mice than in conv mice following stimulation with either antigen suggesting that, even if the germfree animal has fewer competent cells, these cells are less committed due to lack of previous antigenic stimulations. In vivo antibody production in the germfree-conv model shows a direct relationship to the amount of antibody-producing cells found in these animals, suggesting that this model may be a tool for studies on the kinetics of antibody formation in in vivo nonirradiated conditions. (Author)

AD-641 838 **Field 6E**
Not available from CFSTI.
Armed Forces Inst. of Pathology, Washington, D. C.
LEAD ENCEPHALOPATHY,
by Peter W. Lampert. 1966, 1p
Prepared in cooperation with Veterans Administration, Washington, D. C. Central Lab. for Anatomic Pathology and Research.
Availability: Published in The Bulletin of Pathology p222-3 Sep 1966.

Descriptors: (*Metal poisoning, Brain), Pathology, Cerebellum, Electron microscopy, Cytology, Rats, Tracer studies.

Chronic lead intoxication, in infants and children, may cause an acute encephalopathy clinically characterized by vomiting, headache, drowsiness, or coma. Papilledema and alterations in pupillary size and reaction may be seen. Pathologically, the most striking findings are related to damaged vessels. Whereas edema of the brain associated with petechial hemorrhages and perivascular serous transudates may be observed in acute cases, chronic cases are characterized by proliferating endothelial cells, microglial cells, and astrocytes; and perivascular accumulations of lymphocytes, most strikingly in the cerebellum.

AD-641 882 **Field 6E**
Not available from CFSTI.
Hong Kong Univ. Dept. of Pathology.
CHINESE LIVER FLUKE--CLONORCHIS SINENSIS--ITS OCCURRENCE IN HONG KONG,
by James B. Gibson, M. C. Path, and T. Sun. Oct 65, 12p
Grant AF-AFOSR-683-64
Proj. AF-9777
Task 977701
AFOSR-66-0843
Availability: Published in International Pathology v6 n4 p94-8 Oct 1965.

Descriptors: (*Parasitic diseases, Hong Kong), Trematodes, Life cycle, Infections, Humans, Pathology, Diagnosis.

Identifiers: Clonorchis.

The life cycle of Clomorchis sinensis is reviewed and related to mechanisms by which man becomes infected. The prevalence of clonorchiasis and changes in incidence since World War II are discussed. The pathologic characteristics of clonorchiasis and its important complications are presented, together with pathogenesis. (Author)

AD-641 900 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
Geoscience Ltd., La Jolla, Calif.
WHOLE ORGAN FREEZING AND THAWING HEAT TRANSFER AND THERMAL PROPERTIES.
Quarterly rept. 1 Jul-30 Sep 66,
by H. F. Poppendiek, N. D. Greene, and R. Randall. 30 Sep 66, 16p GLR-48
Contract Nonr-4095 (00)
See also AD-638 648.

Descriptors: (*Tissues (Biology), *Freezing), Thermal conductivity, Melting, Thermal properties, Viability, Heat transfer, Calorimeters, Specific heat, Body fluids, Storage, Preservation.

Progress of research in the following areas is summarized: Thermal conductivity and heat capacity of biological fluids and tissues; freeze-thaw heat transfer analysis; rapid thawing of stored organs.

AD-641 929 **Field 6E**
Not available from CFSTI.
Naval Medical Research Inst., Bethesda, Md.
HISTOLOGIC RESPONSE OF BONE TO SECTIONING BY HIGH-SPEED ROTARY INSTRUMENTS,
by Philip J. Boyne. 2 Nov 64, 9p
NAVMED-MR005.19.6037-11
Availability: Published in Journal of Dental Research v45 n2 p270-6 Mar-Apr 1966.

Descriptors: (*Bone, Healing), (*Surgery, Mouth), Teeth, Surgical techniques, Histology, Dentistry, Morphology (Biology), Surgical instruments, Fluorescence.

The study was undertaken to evaluate histologically the healing of mandibular and maxillary alveolar ridges following the removal of bone during tooth extraction by high and low-speed rotary instruments. These areas of surgery were compared with defects made in femurs of dogs and standardized defects produced at the inferior border of the mandible. Chronologic stages of osseous repair oriented by tetracycline induced fluorescence indicated that at 14 days postoperatively more new bone was forming at surfaces cut by the high speed instrument than the low speed bur. Six weeks after surgery, no difference in the degree of osseous repair of the two types of defects could be detected. Certain morphologic differences were observed when the high speed cut defects were compared with the low speed sectioned areas. These differences were not considered to be significant, however. The results of this study would tend to support the use of these high speed instruments in oral surgery. (Author)

AD-641 933 **Field 6E, 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
PATHOPHYSIOLOGY OF ANTHRAX,
by Frederick Klein, Jerry S. Walker, David F. Fitzpatrick, Ralph E. Lincoln, and Bill G. Mahlandt. 17 Sep 65, 16p
Availability: Published in Journal of Infectious Diseases v116 p123-38 Apr 1966.

Descriptors: (*Bacillus anthracis, Diseases), Pathology, Toxins + antitoxins, Blood, Bacteria, Monkeys, Chimpanzees, Rabbits, Leukocytes, Blood chemistry, Spores, Erythrocytes.

The disease syndromes produced by both Bacillus anthracis organisms and by sterile in vitro toxins are orderly and predictable. Most of the signs and changes in the blood cellular, chemical, and gaseous elements occur late in the septicemic phase of disease, whereas similar changes occur earlier after administration of toxins. The only pathophysiological response peculiar to any of the 3 species of animals used in this study (rhesus monkey, chimpanzee, and rabbit) was the presence of nucleated red blood cells in the rabbit and the absence of these cells in the 2 primates. All effects appeared to be nonspecific and included elevation of white blood cells with a marked shift to the left, decreased calcium, sodium, and cholinesterase, and increased potassium, chloride, and phosphate. Hyperesthesia frequently was observed, and late in the course of disease a terminal hypoglycemia with alkalosis and hypoxia occurred. One of the most significant observations was failure of the body to respond to the organisms per se but rather to the toxins of B. anthracis. (Author)

AD-641 987 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
Washington Univ., Seattle. Dept. of Preventive Medicine.

STUDIES OF INFECTIOUS DISEASES OF TAIWAN.
Final rept., 1 Aug 65-31 Jul 66,
by J. Thomas Grayston, E. Russel Alexander, Howard M. Jenkin, and Irvin Emanuel.12 Nov 66, 6p
Grant Nonr (G)-00025-65
Proj. NR-105-322
Prepared in cooperation with Naval Medical Research Unit No. 2, Taipei (Taiwan).

Descriptors: (*Infectious diseases, Taiwan), Chlamydia trachomatis, Toxicity, Eye, Diseases, Infections, Vaccines, Pregnancy, Reproductive system, Females, Tissue culture, Anomalies.

Identifiers: TRIC agents, Conjunctivitis.

Trachoma and inclusion conjunctivitis strains (TRIC strains) isolated on Taiwan and those received from laboratories throughout the world have been classified in the mouse toxicity prevention test into three major groups from ocular trachoma and three other major groups made up almost entirely of non-ocular trachoma TRIC strains (eg. genital, inclusion conjunctivitis). Vaccine studies in monkeys have confirmed that protection with oil adjuvant preparations of purified vaccines can be obtained with homologous but not heterologous TRIC strains. TRIC agents and cytomegloviruses have been isolated from the genital tract of pregnant women on Taiwan. The significance of these isolations is under investigation. Studies have been continued on the growth of TRIC agents and tissue culture and the factors retarding continuous passage. Studies of congenital malformations on Taiwan now have a total sample base of more than 14,000 live births. Special investigations have been carried out of Down's syndrome, sex anomalies, and the de Lange syndrome. (Author)

AD-642 003 **Field 6E**
Not available from CFSTI.
Naval Medical Research Unit. No. 2, Taipei (Taiwan).
SPECIFIC AND NONSPECIFIC PASSIVE IMMUNITY IN INFANT RABBIT CHOLERA.
Technical rept.,
by J. D. Gillmore, P. M. Versage, and R. A. Phillips. 9 Nov 65, 10p NAMRU-2-TR-246
NAVMED-MF022.03.07-2006.5
Availability: Published in Journal of Infectious Diseases v116 p313-8 Jun 1966.

Descriptors: (*Cholera, Immunity), Immune serums, Diarrhea, Acidosis, Rabbits, Vibrio, Vaccines, Antigens + antibodies, Salmonella, Clostridium tetani, Effectiveness.

The passive protective effect of several specific and non-specific hyperimmune antisera was studied in suckling rabbits using Dutta's intraintestinal method of challenge. The challenge, an egg and rabbit passaged NIH 35A-3 (Inaba) strain, was administered in numbers of from 60 to 840 colony forming units/100 gm. which produced a profuse diarrhea leading to acidosis and death in 18-26 hours. A single 0.5 ml intraperitoneal injection of antiserum obtained from mature rabbits immunized I. V. with the live homologous strain was found to protect 84.0% of the suckling rabbits when administered 48 to 72 hours before challenge. Hyperimmune antisera prepared in like manner with an egg and rabbit passaged Vibrio cholerae, Ogawa strain gave only 13% protection as compared with 27.6% protection obtained with antiserum from rabbits immunized I. V. with a commercial Typhoid-Paratyphoid vaccine and 20% protection with antisera from animals immunized with a vibrio-free mucinase preparation. No protection was afforded by antiserum from Tetanus Toxoid immunized animals while 9.4% and 3.4% of suckling rabbits survived receiving normal rabbit serum or saline respectively, as controls. (Author)

AD-642 004 **Field 6E**
Not available from CFSTI.
Naval Medical Research Inst., Bethesda, Md.
AN AUTORADIOGRAPHIC STUDY OF TRYPTOPHANE-H3 INCORPORATION INTO RAT ENAMEL AND DENTINE MATRICES.
Medical research interim rept.,
by W. R. Cotton, and S. M. Hefferren. 1966, 16p
NAVMED-MR-005.19.6001-18
Prepared in cooperation with Naval Medical Research Inst., Bethesda, Md. Dept. of Dental Research, and American Dental Association, Chicago, Ill.
Availability: Published in Archs oral Biol v11 p1027-37 1966.

Descriptors: (*Teeth, *Tryptophan), (*Autoradiography, Tryptophan), Tritiated compounds, Labeled substances, Dentistry, Rats, Cytology.

L-tryptophane-H3 was administered intraperitoneally, 1 microcurie/g of body weight, to 9-day-old NMRI-D rats. The rats were killed, 1, 4, 8 and 24 hr and 7 days post-injection. The incorporation and distribution of tryptophane-H3 were evaluated in autoradiographs of the developing mandibular first molars. At 1 hr the cytoplasm labelling of the ameloblasts was considerably greater than the odontoblast labelling. The cytoplasm grain density over the ameloblasts gradually decreased as the labelling of the enamel matrix increased. At 4 and 8 hr the labelling was primarily concentrated over the predentine and the first 4 layers (layer = 9.3 microns x 130.2 microns of enamel matrix. At 7 days the dense labelling of the enamel matrix was diffusely spread throughout, whereas the dentine remained sparsely labelled. The observation that tryptophane is a component of the organic matrices of enamel in developing rat molars is confirmed by autoradiography. (Author)

PB-173 474 **Field 6E, 9B, 5B**
CFSTI Prices: HC$1.60 MF$0.50
Systems Development Corp., Santa Monica, Calif.
AUTOMATING A HOSPITAL INFORMATION SYSTEM,
by Ellis P. Myer, and Leonard D. Gross. 24 Oct 62, 16p SP-913
Presented at the Annual Conference on Engineering in Medicine and Biology, (15th) Chicago, Ill., Nov 5-7, 1962. Rept. on NSF Scientific Documentation Project.

Descriptors: (*Data processing systems, *Hospitals), Automation, Models (Simulations), Information theory, Medicine.

Identifiers: IBM 1401.

An automated data processing system has been developed that stores, processes, summarizes, and retrieves selected clinical and administrative information in a simulated real-time hospital environment. Using data from actual patient records, an IBM 1401 RAMAC system was programmed to: (1) Produce readable clinical forms and administrative reports that are compatible with record-keeping procedures in current use; (2) Accept, retrieve, and display clinical and administrative data on demand 24 hours a day; (3) Provide hospital management and professional staff with timely status reports and workload forecasts; and (4) Reduce the paper-handling tasks of medical personnel. This paper describes the development of the simulated hospital model, from its inception through completion, and emphasizes techniques used and problems encountered. The successful performance of this integrated information system demonstrates the practical benefits that can be derived from applying electronic data processing techniques to hospital operation. The paper concludes with a discussion of future developmental work required to implement an operational automated hospital information system. (Author)

PB-173 483 **Field 6E**
CFSTI Prices: HC$3.00 MF$0.75
Hittman Associates, Inc., Baltimore, Md.
SIX STUDIES BASIC TO CONSIDERATION OF THE ARTIFICIAL HEART PROGRAM.
Final summary rept.
24 Oct 66, 57p HIT-235
Contract PH-43-66-90
See also PB-173 050, PB-173 051, PB-173 052.

Descriptors: (*Mechanical organs, Implants), (*Implants, Cardiovascular diseases), Medical equipment, Specifications, Heart, Blood Circulation.

AD-463 787 **See Field 15F**

AD-641 478 **See Field 1B**

AD-641 566 **See Field 6S**

AD-641 840 **See Field 6P**

AD-641 999 **See Field 6O**

N66-38368 **See Field 6A**

6F. ENVIRONMENTAL BIOLOGY

AD-641 747 **Field 6F, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Frederick, Md.
PROBLEMS OF EPIDEMIOLOGICAL GEOGRAPHY. REPORT IV. ZONAL, REGIONAL AND RESIDUAL NOSOLOGICAL AREAS OF DISEASE,
by I. I. Elkin, and V. K. Yashkul. Jul 65, 13p
Trans-1463
TT-66-62575
Trans. of Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (USSR), v41 n2 p73-80 1964.
See also AD-638 579.

Descriptors: (*Epidemiology, Geography), Ecology, Infectious diseases, Disease vectors, Virus diseases, Population, USSR.

Identifiers: Nosological areas, Anthroponoses, Zoonoses.

N66-34072 **Field 6F**
CFSTI Prices HC$1.00 MF$0.50
Northrop Space Labs., Hawthorne, Calif.
INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY PROGRESS REPORT, 1 APR. - 30 JUN. 1966.
by R. G. Lindberg. 1966, 18p NASA-CR-77100, NSL-64-29-11
Contract NASW-812

Descriptors: *Anatomy, *Brain, *Mouse, Animal, Central, Hibernation, Nervous, Neurophysiology, Physiology, Process, Study, System.

For abstract, see STAR 04 19.

AD-641 572 **See Field 6A**

6G. ESCAPE, RESCUE, and SURVIVAL

AD-641 895 **Field 6G**
CFSTI Prices: HC$2.00 MF$0.50
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DEVELOPMENT OF MINIATURE SMOKE SIGNAL PACKAGE FOR INCLUSION IN SURVIVAL KITS,
by Everett D. Crane, Burton Werbel, and Garry Weingarten. Oct 66, 46p
Proj. DA-4605-03-001
PA-TR-3294

Descriptors: (*Distress signals, *Smokes), (*Survival kits, Signals), Colors, Combustion, Visibility, Feasibility studies.

A signal for burning on the ground was designed which produces a red smoke cloud that can be detected and recognized at a distance of about 6,500 feet and a height of 1000 feet. The signal weighs about 30 grams and is 1 1/4 inches in diameter by 1 1/4 inches high, which corresponds to a calculated volume of 1.5 cubic inches. Production of a colored cloud display at an altitude of 250 feet which is visible at a distance of 6,500 feet appears feasible for a signal having a diameter of about 1 1/4 inches and a height of 2 1/2 inches (volume of 3.1 cubic inches). (Author)

6H. FOOD

N66-33699 **Field 6H**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
THE INFLUENCE OF LOW TEMPERATURE ON THE DEVELOPMENT OF MICROORGANISMS. PART IV - THE INFLUENCE OF LOW TEMPERATURE ON THE GROWTH OF MOLDS.
Vliyaniye Nizkikh Temperatur Na Razvitiye Mikroorganizmov. Iv - Vliyaniye Nizkikh Temperatur Na Razvitiye Plesnevykh Gribkov
by Z. Z. Bocharova, and F. M. Chistyakov. May 66, 11p NASA-TT-F-10145
Transl. Into English From Mikrobiologiya (Moscow), V. 7, 1938 P 838-842

Descriptors: *Environmental testing, *Low temperature environment, *Mold, Cold, Environment, Fish, Food, Growth, Low temperature, Microorganism, Storage, Table, Testing.

For abstract, see STAR 04 19.

6K. LIFE SUPPORT

N66-38499 **Field 6K**
CFSTI Prices HC$3.25 MF$1.25
Trw Equipment Labs., Cleveland, Ohio. New Products Dept.
CARBON DIOXIDE CONCENTRATION SYSTEM FINAL REPORT.
by A. D. Babinsky, D. L. De respiris, and S. J. Derezinski. 30 Jul 66, 177p NASA-CR-72086, TRW-ER-6661-9
Contract NAS3-7638

Descriptors: *Carbon dioxide, *Electrochemical cell, *Space cabin atmosphere, Carbonate, Cell, Concentration, Data, Design, Engineering, Feasibility, Gold, Magnesium, Nickel, Plastic, Plate, Potassium, Temperature, Test.

For abstract, see STAR 04 23.

6L. MEDICAL AND HOSPITAL EQUIPMENT

AD-641 565 **Field 6L**
CFSTI Prices: HC$1.00 MF$0.50
Naval Medical Research Inst., Bethesda, Md.
INTEGRATING PHOTOELECTRIC RECORDER FOR PAPER AND OTHER ELECTROPHORETIC MEASUREMENTS.
Research rept.,
by Julius Sendroy, Jr., Maynard Eicher, and F. Lee Rodkey. 10 Oct 66, 21p
NAVMED-MR-005.04.0002-12

Descriptors: (*Electrophoresis, *Laboratory equipment), Automatic, Recording systems, Proteins, Paper, Densitometers.

A versatile, economical, laboratory-assembled instrument which automatically scans paper electrophoresis strips, and records and integrates the peaks of curves corresponding quantitatively to the distribution of the dyed protein components, is described. (Author)

AD-641 571 **Field 6L**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
A SIMPLE PORTABLE SONOMICROMETER.
Rept. for Mar-Jul 66,
by Merrill B. Kardon, Hugh F. Stegall, and Hubert L. Stone. Nov 66, 17p SAM-TR-66-96
Task 793003

Descriptors: (*Micrometers, Medical equipment), Portable, Ultrasonic radiation, Piezoelectric crystals, Physiology, Measurement, Heart.

The design and construction of a relatively simple and inexpensive ultrasonic dimension gage (sonomicrometer) are described in detail. Two piezoelectric crystals are installed surgically across the organ to be studied, and the transit time for a burst of ultrasound to pass from one crystal to the other is measured. The device is easily calibrated when sound velocity in the medium is known. By use of integrated circuits throughout, it may be duplicated for less than $55. Possible applications other than continuous measurements of organ size are discussed. (Author)

AD-641 939 **Field 6L, 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
CONTROLLED pH AND OXIDATION-REDUCTION POTENTIAL WITH A NEW GLASS TISSUE-CULTURE FERMENTOR,
by William F. Daniels, David A. Parker, Roger W. Johnson, and Louis E. Schneider. 28 Apr 65, 25p
Availability: Published in Biotechnology and Bioengineering v7 p529-53 1965.

Descriptors: (*Tissue culture, Instrumentation), Containers, pH, Oxidation-reduction reactions, Temperature control, Control systems.

A 1-l. fermentor was designed and tested for use as a tissue-culture vessel. It features a temperature control device, impeller agitation without the necessity of a shaft seal, and a means of measuring, recording, and controlling both pH and oxidation-reduction potential (ORP). Tests have shown the ORP to change fairly rapidly with impeller speed variations under conditions of a continuous carbon dioxide-air overlay. Working with strain L mouse fibroblasts (Earle), cell counts of more than 1250000 ml., without centrifugation and medium renewal, were achieved, and cell counts were maintained above 1000000 for more than 30 hr. With the vessel studied, pH control was plus or minus 0.25, the ORP control was plus or minus 10 mV. Controlled environments for tissue-cell metabolic studies are entirely feasible with this system. (Author)

AD-641 831 **See Field 6A**

AD-641 910 **See Field 6A**

AD-641 928 **See Field 18D**

6M. MICROBIOLOGY

AD-641 516 **Field 6M**
Not available from CFSTI.
Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
GROWTH OF ACTINOBACILLUS MALLEI IN CHEMICALLY DEFINED MEDIA,
by D. H. Evans. 24 Jun 65, 9p DCBRL-493
Availability: Published in Canadian Journal of Microbiology v12 p617-23 1966.

Descriptors: (*Actinobacillus, Growth), Culture media, Viability, Nitrogen, Glucose, Ammonium compounds, Salts, pH, Citrates, Iron compounds, Magnesium compounds, Sulfates, Phosphates, Buffers, Canada.

A simple, chemically defined liquid medium containing phosphate buffer, magnesium and ferrous sulfates, glucose, and tribasic ammonium citrate supported excellent growth of a virulent strain of Actinobacillus mallei. When growth was measured turbidimetrically, a comparison of the rates of growth in media containing different initial concentrations of hydrogen ion (pH 6.3 and 6.6), phosphate buffer (0.05 M and 0.08 M), glucose (0.05 M and 0.10 M), and ammonium citrate (0.01 M and 0.02 M) indicated that the lower concentration of phosphate, glucose, and citrate and pH 6.3 favored early growth. The higher concentration of glucose favored an increase in cell mass during the early stationary phase unaccompanied by a comparable increase in viable cells. The highest viable cell count was attained in a medium containing 0.08 M KH2PO4-K2HPO4, 0.05 M glucose, 0.02 M ammonium citrate, 0.000005 M Fe (++), and 0.001 M Mg (++) after 45 hours incubation, during which time the viable cell concentration rose from 1.6 X 10 to the 7th power to 1.5 X 10 to the 10th power/ml. (Author)

AD-641 517 **Field 6M**
Not available from CFSTI.
Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
COLONIAL VARIATION IN ACTINOBACILLUS MALLEI,
by D. H. Evans. 24 Jun 65, 12p DCBRL-492
Availability: Published in Canadian Journal of Microbiology v12 p609-16 1966.

Descriptors: (*Actinobacillus, Growth), Culture media, Yeasts, Glucose, Glycerols, Morphology (Biology), Viability, Canada.

An examination of colonies of 51 strains of Actinobacillus mallei grown on a complex agar medium containing heart infusion broth, yeast extract, glucose, and glycerol indicated a high degree of heterogeneity in respect of colonial morphology both within and between strains. A strain possessing high virulence for hamsters (I. P. L. D. 50 for hamsters < 20 cells) was almost completely homogeneous, and colonies of this strain, when viewed microscopically using an oblique lighting technique, were buff in color and had a dull, slightly rough surface and even edges with a slightly crosshatched appearance. The designation 'typical' was given to colonies of this type. Other colonial types designated as 'smooth', 'intermediate', and 'dense, yellow' were isolated from subcultures of this strain. Additional colony types were found upon examination of other strains; these include a 'wrinkled' variant and several forms of granular and rough colonies. Prolonged incubation of stationary broth cultures of several strains led to the establishment of new colonial types in several strains, tested, and 'wrinkled' and 'white, opaque, glistening' colonies were isolated from cultures inoculated with 'typical' and 'intermediate' forms. The relationship of these findings to the earlier work of Mochida is discussed. (Author)

AD-641 518 **Field 6M**
Not available from CFSTI.
Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
USE OF KANAMYCIN FOR THE ISOLATION OF AUXOTROPHIC MUTANTS OF ACTINOBACILLUS MALLEI,
by D. H. Evans. 24 Jun 65, 15p CBRL-494
Availability: Published in Canadian Journal of Microbiology v12 p641-52 1966.

Descriptors: (*Actinobacillus, *Mutations), Viability, Culture media, Amino acids, Antimetabolites, Antibiotics, Canada.

Identifiers: Kanamycins.

Growth of Actinobacillus mallei was inhibited by kanamycin; the minimal inhibitory concentration in a complex medium was 1.25 micrograms ml and in a chemically defined medium 5 micrograms/ml. Higher concentrations of kanamycin had a pronounced bactericidal effect. When a suspension of cells containing 5 X 10 to the 7th power viable cells/ml was incubated in the presence of 20 micrograms/ml of kanamycin in a chemically defined medium, complete sterilization resulted after 6 hours. Cells irradiated with ultraviolet light were grown in complex or supplemental minimal media, washed, and exposed to 20 micrograms/ml of kanamycin in minimal medium for 4 hours. Auxotrophic mutants with requirements for tryptophane, phenylalanine, proline, and uracil were detected among the survivors of kanamycin treatment. After treatment with 0.01 M nitrous acid and growth in minimal medium supplemented with amino acids, cells were washed and then exposed to kanamycin in minimal medium. The proportion of auxotrophs among the survivors varied from 1.3 to 75%. Mutants with requirements for each of the following amino acids were identified: methionine, methionine or cystine, arginine, leucine, tryptophane, histidine, and proline, with methionine-requiring mutants predominating. Exposure of mixtures of prototrophs and uracil-dependent and methionine-dependent auxotrophs to 20 micrograms/ml of kanamycin for 4 hours resulted in approximately 700- and 300-fold increases, respectively, in the ratio of auxotrophs to prototrophs. (Author)

AD-641 519 **Field 6M**
Not available from CFSTI.
Defence Chemical, Biological and Radiation Labs., Ottawa (Ontario).
UTILIZATION OF CARBOHYDRATES BY ACTINOBACILLUS MALLEI,
by D. H. Evans. 24 Jun 65, 17p DCBRL-489
Availability: Published in Canadian Journal of Microbiology v12 p625-39 1966.

Descriptors: (*Actinobacillus, Carbohydrates), Culture media, Chemical indicators, Growth, Identification, Canada.

Twenty-three substrains representing colonial variants of 11 strains of Actinobacillus mallei were examined for their ability to attack carbohydrates. Tests conducted in a basal liquid complex medium, containing yeast extract and proteose peptone No. 3 with bromcresol purple as indicator, showed that all strains tested produced acid from arabinose, glucose, fructose, galactose, mannose, and trehalose, while five substrains gave positive results with lactose, one with sucrose, and two with maltose. Eosin methylene blue agar of the same basal composition gave positive results for most of the strains grown on arabinose, glucose, fructose, galactose, mannose, and trehalose, and negative results for all strains grown on xylose, lactose, sucrose, and maltose. In a chemically defined medium containing ammonium chloride as nitrogen source and bromcresol purple as indicator, acid was produced by eight substrains of five of these strains from glucose, galactose, mannose, and trehalose, and by several strains from fructose and sucrose. The ability of these five selected strains to utilize carbohydrates as sole carbon sources for growth was tested in a chemically defined medium containing ammonium citrate as nitrogen source. All strains were able to grow on glucose, galactose, mannose, and trehalose, and most were able to grow on fructose. Arabinose, xylose, lactose, sucrose, and maltose did not support the growth of any of the strains tested. (Author)

AD-641 821 **Field 6M, 4A**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
MICROORGANISMS OF THE UPPER ATMOSPHERE. IV. MICROORGANISMS OF A LAND AIR MASS AS IT TRAVERSES AN OCEAN,
by John D. Fulton. 25 Oct 65, 8p SAM-TR-65-301
Proj. AF-7754
See also AD-641 823.
Availability: Published in Applied Microbiology v14 n2 p241-4 1966.

Descriptors: (*Microorganisms, *Upper atmosphere), Oceans, Air, Bacteria, Fungi, Sampling, Altitude.

The viable micropopulations at three altitudes (152, 1,066, and 1,981 meters) of a land air mass as it traversed an ocean was determined. At the low altitude a consistent pattern of decrease in numbers of land-originating microorganisms with increasing distance from shore was observed. At the higher altitudes the observed pattern was one of irregularity. At the lower altitude the percentages of bacteria and fungi predominated over the bacteria at all sampling locations. The greatest number of different genera of both bacteria and fungi were obtained at or near the coast. Fungi of the genera Alternaria, Hormodendron, Penicillium, and Aspergillus and bacteria of the genera Micrococcus and Bacterium predominated at all altitudes and locations. (Author)

AD-641 823 **Field 6M, 4A**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
MICROORGANISMS OF THE UPPER ATMOSPHERE. II. MICROORGANISMS IN TWO TYPES OF AIR MASSES AT 690 METERS OVER A CITY,
by John D. Fulton, and Roland B. Mitchell. 25 Oct 65, 9p SAM-TR-65-298
Proj. AF-7754
See also AD-641 825, AD-641 821.
Availability: Published in Applied Microbiology v14 n2 p232-6 1966.

Descriptors: (*Microorganisms, *Upper atmosphere), Air, Distribution, Bacteria, Fungi, Altitude.

The viable micropopulation found, at altitude over a city, in a land air mass was significantly higher than that found in a marine influenced air mass. The percentage distribution of bacteria and fungi was approximately equal in both types of air masses. This indicates that, under the conditions of the experiment, the marine air mass was influenced by the land area over which it traversed during passage from its source to the sampling area. Activities taking place within the city significantly increased the micropopulation at altitude. This increase was quantitatively so small that it was not identifiable when the micropopulation moving into the city was high--as in a land air mass--but was recognizable when the micropopulation was low--as in a marine influenced air mass. The modification of the micropopulation at altitude by temperature inversions was shown. (Author)

AD-641 825 **Field 6M, 4A**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
MICROORGANISMS OF THE UPPER ATMOSPHERE. I. INSTRUMENTATION FOR ISOKINETIC AIR SAMPLING AT ALTITUDE,
by Durward E. Timmons, John D. Fulton, and Roland B. Mitchell. 25 Oct 65, 7p SAM-TR-65-299
Proj. AF-7754
See also AD-641 823.
Availability: Published in Applied Microbiology v14 n2 p229-31 1966.

Descriptors: (*Microorganisms, *Upper atmosphere), Samplers, Airborne, Altitude, Atmospheric temperature, Instrumentation, Air.

An aircraft-mounted air sampling system for the collection of microorganisms from the upper air is described. The system is highly suitable for use in upper air sampling from an aircraft because (1) it is an isokinetic system (2) it is simple to operate (3) it employs a dry filter (4) the volume sampled can be easily determined and (5) it operates efficiently at all altitudes and ambient temperatures. (Author)

AD-641 936 **Field 6M, 6C**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
DIRECT FLUORESCENT LABELING OF MICROORGANISMS AS A POSSIBLE LIFE-DETECTION TECHNIQUE,
by Abe Pital, Sheldon L. Janowitz, Charles E. Hudak, and Evelyn E. Lewis. 3 Sep 65, 5p
Availability: Published in Applied Microbiology v14 n1 p119-23 Jan 1966.

Descriptors: (*Microorganisms, Fluorescence), (*Space biology, Labeled substances), Thiocyanates, Proteins, Dyes.

Microorganisms and selected proteinaceous substances were directly tagged with fluorescein isothiocyanate. This approach suggested a possible application for detection of extraterrestrial life. A stable and apparently specific linkage was formed with protein, and nonprotein substances were readily destained. Soil and atmospheric debris did not exhibit any significant affinity for the dye. (Author)

AD-641 937 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
HEMAGGLUTINATION-INHIBITION METHOD AND IMMUNOFLUORESCENCE STAINING WITH VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS,
by Michael Shepel. 18 Oct 65, 7p
Availability: Published in Applied Microbiology v14 n3 p346-52 May 1966.

Descriptors: (*Serodiagnosis, *Venezuelan equine encephalomyelitis virus), Fluorescent antibody techniques, Effectiveness, Test methods, Immune serums.

Identifiers: Hemagglutination-inhibition tests.

Hemagglutination and fluorescent antibody (FA) are compared for the direct detection of virus devoid of host cells. A determination was made of the minimal number of tissue plaque-forming units of Venezuelan equine encephalomyelitis virus that could be detected by the hemagglutination technique. Similar concentrations of the virus in bovine albumin borate saline, Brain Heart Infusion broth (Difco), and demineralized water were tested by the FA technique. Somewhat higher concentrations of the virus in bovine albumin borate saline were used in the hemagglutination-inhibition test. The quantitative hemagglutination procedure employed for these studies was carried out at 37 C for 75 min with variations in concentration of goose red cells. As a result of lowering the red cell concentration, smaller concentrations of virus were detected. The direct FA staining procedure applied to slide preparations containing known numbers of tissue culture plaque-forming units of virus was negative. Adsorbed viral antigen on agglutinated goose erythrocytes was visualized by direct and indirect FA techniques. (Author)

AD-641 938 **Field 6M**
Not available from CFSTI.
Army Biological Lab., Frederick, Md.
MODIFIED GRADIENT PLATE FOR USE IN THE VIRUS PLAQUE TECHNIQUE,
by William T. Soper. 22 Dec 65, 2p
Availability: Published in Applied Microbiology v14 n3 p470-1 May 1966.

Descriptors: (*Venezuelan equine encephalomyelitis virus, Growth), Culture media, Laboratory equipment, Immune serums, Bacteria, Resistance (Biological), Antibiotics.

The report describes the preliminary results obtained in an application of the gradient plate concept to the virus plaque technique. In this test sys-

tem immune serum was used as an inhibitor of plaque formation by Venezuelan equine encephalomyelitis (VEE) virus. (Author)

AD-641 940 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
RAPID CHANGES IN BACTERIA FOLLOWING INTRODUCTION INTO HYPERTONIC MEDIA,
by Stanley Lovett. 26 Jul 65, 5p
Availability: Published in Proceedings of the Society for Experimental Biology and Medicine v120 p565-69 1965.

Descriptors: (*Bacteria, Osmosis), Dehydration, Cell structure, Morphology (Biology), Permeability, Serratia marcescens, Sodium compounds, Chlorides, Urea.

The rapid osmotic dehydration of S. marcescens produced when an aqueous suspension of the organisms was rapidly and efficiently mixed with solutions of sodium chloride was followed from 2.0-3.0 milliseconds after mixing by the change in light scattering of the suspension. After a small decrease the light scattering rose to a maximum which depended on the concentration of sodium chloride. The increase in light scattering was associated with the shrinking of the bacteria during osmotic dehydration. When the bacteria were introduced into a solution of a permeating solute, urea, there was an initial increase in the light scattering followed by a decrease to a value almost equal to that produced by the suspension in water. These changes are probably due to the initial shrinking of the bacteria due to osmotic dehydration followed by swelling to the original volume as urea and water enter the cells. (Author)

AD-641 942 **Field 6M**
Not available from CFSTI.
Army Biological Lab., Frederick, Md.
PRESERVATION OF SERRATIA MARCESCENS BY HIGH-VACUUM LYOPHILIZATION,
by Robert R. Dewald. 10 Feb 66, 7p
Availability: Published in Applied Microbiology v14 n4 p561-7 Jul 1966.

Descriptors: (*Serratia marcescens, Freeze drying), Viability, Stability, Pressure, Preservation, Vacuum.

Water-washed Serratia marcescens (ATCC strain 14041) cells were lyophilized in an all-glass system capable of evacuation to pressures of less than .000005 torr. Lyophilization at the lowest pressures resulted in 50 to 65% survival for unstabilized washed organisms compared with 10 to 20% when the cells were lyophilized at pressures of about .025 torr. At the latter pressures, 45 to 65% survival was obtained when NaCl or Naylor-Smith stabilizer was added to the cell suspensions before lyophilization. However, the stabilizers failed to increase significantly the levels of survival compared with water suspension when cells were lyophilized at pressures less than .00001 torr. The high survival rates obtained by the high-vacuum technique may be attributed to the reduction of traces of molecular oxygen which has been reported to be destructive of the dried bacteria. Survival of unstabilized dried S. marcescens after 1-day storage increased markedly with decreasing sealing pressure. Under the highest vacuum attained, survival of the dried bacteria was not impaired by storage for up to 1 month at Dry Ice temperatures; at higher temperatures, viability losses occurred. Exposure of the dried unstabilized bacteria to dry air resulted in rapid viability loss. The inactivation could be stopped almost immediately by evacuation to pressures of less than :00001 torr, but the evacuation failed to reverse the viability losses that occurred during exposure. (Author)

AD-641 944 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
HOST INFLUENCE ON THE CHARACTERISTICS OF VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS,
by Fred P. Heydrick, Ralph F. Wachter, and Henry J. Hearn, Jr. 24 Jan 66, 7p
Availability: Published in Journal of Bacteriology v91 n6 p2343-8 Jun 1966.

Descriptors: (*Venezuelan equine encephalomyelitis virus, Tissue culture), Viability, Lipids, Tissue culture cells.

Alterations in plaque size, virulence, and lipid content of Venezuelan equine encephalomyelitis (VEE) virus were examined for possible interrelationships among these properties during 10 serial passages in embryonated eggs, suckling mice, chick embryo fibroblasts, and L cells. The chick embryo host maintained the same large-plaque and virulence properties of the virus through 10 passages as seen in the original seed. Passage of virus in either L cells or chick fibroblasts rapidly produced populations that were, in the main, intermediate with respect to plaque size and virulence. Passage of virus in suckling mouse brain yielded populations that were intermediate with respect to plaque size only. The nature of the lipid of the virus, in terms of the ratio of petroleum ether-soluble to-insoluble lipid, changed after only one passage in all systems except in chick embryos. Nine additional serial passages failed to enhance these changes in viral lipid, suggesting that the decrease in the large-plaque and virulence properties was not directly associated with changes in lipid content. (Author)

AD-641 945 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
DIFFERENTIAL MEDIA FOR THE IDENTIFICATION OF BACILLUS ANTHRACIS,
by Ralph F. Knisely. 21 Aug 65, 7p
Availability: Published in Journal of Bacteriology v90 n6 p1778-3 Dec 1965.

Descriptors: (*Bacillus anthracis, Identification), (*Culture media, Bacillus anthracis), Alcohols, Hydrates, Classification, Bacillus cereus, Spores.

Identifiers: Benzyl carbinols, Chloral hydrate.

Two new differential media for the identification of Bacillus anthracis are described. Phenethyl alcohol and chloral hydrate were used as selective ingredients. These media should aid in the differentiation of B. anthracis from B. cereus and, if used in conjunction with other differential tests, they should also differentiate B. anthracis from the majority of other aerobic sporeforming bacilli. These media might also be useful in the classification of Bacillus species. (Author)

AD-641 946 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
A PRACTICAL METHOD FOR PARTIAL PURIFICATION OF THE ORGANISM OF PSITTACOSIS GROWN IN CHICKEN EMBRYO YOLK SAC,
by William N. Shirey, Warren G. Dorsey, and William C. Patrick, III. 1965, 8p
Availability: Published in Biotechnology and Bioengineering v7 p447-54 1965.

Descriptors: (*Miyagawanella psittaci, Purification), Lipids, Proteins, Embryonated egg technique.

Identifiers: Psittacosis-lymphogranuloma venereum-trachoma, Psittacosis.

A procedure described for the partial purification of suspensions of the organisms of psittacosis utilizes tryptic digestion, calcium chloride-dextran sulfate precipitation, and centrifugation through a sucrose barrier. More than 40% of the organisms in the original suspension are recovered in 80% of the original volume, with approximately 95% of the lipids and 85% of the proteins removed. This method is suggested as a preliminary purification procedure in laboratories desiring relatively large amounts of purified agent for studies on metabolism, physical properties, or antigenicity of the organism. Significant aspects of the investigations leading to the selection of the procedures are included. (Author)

AD-641 947 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
BIOCHEMICAL AND PHYSICAL CHANGES IN SHAKEN SUSPENSIONS OF PASTEURELLA PESTIS,
by G. E. Wessman, and Donna J. Miller. 18 Mar 66, 8p
Availability: Published in Applied Microbiology v14 n4 p636-42 Jul 1966.

Descriptors: (*Pasteurella pestis, Viability), Growth, Culture media, Carbohydrates, Lipids, Amino acids, Nucleic acids, Desoxyribonucleic acids, Enzymes.

Pasteurella pestis, harvested after 24 to 30 hr of growth in a casein hydrolysate medium at 26 C, was resuspended and shaken in 3% lactose-0.1 M phosphate buffer for 4 hr at the same temperature. Certain characteristics of these starved cells were compared with those of control cells. No differences in the amounts of cellular carbohydrate or lipid were detected. The concentrations of the principal free amino acids were greater in the shaken cells, except that they contained no measureable arginine, and the normally large pools of intracellular tricarboxylic acid cycle intermediates were reduced. Greater viable-cell counts resulted with the cells that were shaken in lactose buffer than with the control cells when each was incubated at 5 C for several weeks. However, the reduced viabilities were apparent losses caused by the formation of aggregates of cells. The clumping of cells was caused by the polymerization of extracellular nucleic acids, principally deoxyribonucleic acid, that were excreted by the cells. Cell clumping could be partially prevented by prior shaking of the suspended cells, which removed some of the deleterious material, or by the action of crystalline deoxyribonuclease. (Author)

AD-641 948 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
GROWTH OF DESULFOVIBRIO ON THE SURFACE OF AGAR MEDIA,
by Warren P. Iverson. 14 Jan 66, 7p
Availability: Published in Applied Microbiology v14 n4 p529-34 Jul 1966.

Descriptors: (*Spirillaceae, Growth), (*Culture media, Spirillaceae), Reduction (Chemistry), Yeasts, Salts, Hydrogen, Sodium compounds, Lactates, Magnesium compounds, Sulfates, Iron compounds, Ammonium compounds.

Growth of Desulfovibrio desulfuricans (API strain) was found to take place in an atmosphere of hydrogen on the agar surface of complex media, including yeast extract (Difco), and Trypticase Soy Agar (BBL) without any added reducing agents. For growth on a 2% yeast extract-agar surface in the absence of hydrogen (nitrogen atmosphere), sodium lactate was required in the medium. Growth on the surface of Trypticase Soy Agar (TSA) under nitrogen took place readily in the absence of an added hydrogen donor. A medium (TSA plus salts) is described based upon the addition of sodium lactate (4 ml per liter), magnesium sulfate (2 g per liter), and ferrous ammonium sulfate (0.05%) to TSA, which appears suitable for the isolation and growth of Desulfovibrio on the surface of agar plates in an atmosphere of hydrogen. Sodium lactate does not appear to be essential in this medium for good growth and sulfate reduction in a hydrogen atmosphere, but is essential in a nitrogen atmosphere. Growth of Desulfovibrio

(hydrogen atmosphere) on the agar surface of media commonly used for its cultivation as well as on an inorganic medium containing bicarbonate as a source of carbon is poor and erratic unless inoculated (Desulfovibrio) plates of TSA plus salts are incubated in the same container with plates of these media. This stimulatory effect of incubation with inoculated plates of TSA plus salts medium appears to be due to as yet unidentified volatile material produced by D. desulfuricans when growing on this medium. Another volatile material, or possibly the identical material, appears to act similarly to a hydrogen donor. (Author)

AD-641 949 **Field 6M**
Not available from CFSTI.
Army Biological Center, Frederick, Md.
INHIBITION OF STAPHYLOCOCCAL ENTEROTOXIN B FORMATION IN BROTH CULTURES,
by Mischa E. Friedman. 31 Mar 66, 3p
Availability: Published in Journal of Bacteriology v92 n1 p277-8 Jul 1966.

Descriptors: (*Staphylococcus, Toxins + antitoxins), Inhibition, Culture media, Synthesis, pH, Toxicity.

AD-641 950 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
STREPTOMYCIN INHIBITION OF ELABORATION OF STAPHYLOCOCCAL ENTEROTOXIC PROTEIN,
by Albert J. Rosenwald, and Ralph E. Lincoln. 9 Apr 66, 3p
Availability: Published in Journal of Bacteriology v92 n1 p279-80 Jul 1966.

Descriptors: (*Staphylococcus aureus, Toxins + antitoxins), Streptomycins, Inhibition, Synthesis, Proteins, Resistance (Biological), Growth.

AD-641 951 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
INHIBITION OF PROTEIN SYNTHESIS BY SPERMINE IN GROWING CELLS OF STAPHYLOCOCCUS AUREUS,
by Mischa E. Friedman, and Uriel Bachrach. 26 Feb 66, 8p
Prepared in cooperation with Hebrew Univ., Jerusalem (Israel), Dept. of Clinical Microbiology.
Availability: Published in Journal of Bacteriology v92 n1 p49-55 Jul 1966.

Descriptors: (*Staphylococcus aureus, Antimetabolites), Amines, Labeled substances, Proteins, Synthesis, Growth, Inhibition, pH, Nucleic acids.

Identifiers: Spermine.

Staphylococcus aureus SFL 9725 incorporated valine-C14 into cellular protein. This incorporation was inhibited by spermine when the pH of the culture was adjusted to 7.8, and the inhibition was antagonized partially by Mg (++). The incorporation of C14-labeled leucine, phenylalanine, lysine, arginine, and possibly glutamic acid was inhibited to a much greater extent than that of alanine, glycine, or threonine. The uptake of spermine-C14 by S. aureus cells was rapid. More than 50% of the radioactivity resided in the soluble extract. The protein fraction of the soluble extract contained 99% of the recovered label, whereas the ribonucleic acid and deoxyribonucleic acid fractions contained little or no spermine-C14. (Author)

AD-641 952 **Field 6M**
Not available from CFSTI.
Army Biological Center, Frederick, Md.
EFFECT OF SODIUM BICARBONATE ON PLAQUE FORMATION BY TWO STRAINS OF VENEZUELAN EQUINE ENCEPHALOMYELITIS VIRUS,
by William Thomas Soper. 21 Jan 66, 4p
Availability: Published in Canadian Journal of Microbiology v12 p872-3 1966.

Descriptors: (*Venezuelan equine encephalomyelitis virus, Inhibition), Sodium compounds, Bicarbonates, Growth, Culture media.

Results support the conclusion of Colon et al. that an agar inhibitor is responsible for the 9t strain plaque size; inhibition occurs over a wide range of bicarbonate concentration. However, it was found that PES strain plaques are also reduced if a low bicarbonate concentration is used in the overlay. Presumably, the agar inhibitor is active against the PES strain only if the bicarbonate level in the overlay is low. This finding supports those of Agol and Chumakova, and Liebhaber and Takemoto, demonstrating that agar inhibition can be absent when bicarbonate concentration is relatively high. Liebhaber and Takemoto suggested that sulfated polysaccharides might prevent plaque formation by viruses that are normally cytopathic in liquid cultures. In this sense, it is noteworthy that the 9t strain is more cytopathic in L-cell or chick fibroblast fluid cultures than is the PES strain. The observations reported here emphasize the importance of bicarbonate (pH and ionic strength) in assaying for inhibition by agar-associated factors and for accurately assessing plaque size as a genetic property rather than a phenotypic character. (Author)

AD-641 993 **Field 6M, 6A**
CFSTI Prices: HC$2.00 MF$0.50
Sheffield Univ., (England). Dept. of Microbiology.
METABOLISM OF C1 COMPOUNDS BY MICROORGANISMS.
Final rept.,
by J. R. Quayle. 31 Sep 66, 37p
Grant AF-EOAR-8-64
Proj. AF-9777
Task 977701
AFOSR-66-2588

Descriptors: (*Carbon compounds, Metabolism), (*Pseudomonas, Metabolism), Enzymes, Growth, Mutations, Saccharide phosphates, Ribose, Methane, Methanols, Succinates, Formaldehyde, Formates, Oxalates, Oxidoreductases, Adaptation (Physiology), Great Britain.

Isotopic and enzymatic evidence shows that growth of Pseudonomas methanica on methane or methanol proceeds by a variant on the pentose phosphate cycle into which the carbon enters by addition of formaldehyde to ribose 5-phosphate giving allulose 6-phosphate. The metabolism of C-1 growth substrates by Pseudomonas AM1 has been studied by measurement of activities of enzymes involved in serine metabolism during growth on methanol or succinate, and by isolation of auxotrophic mutants. Studies have been made of regulation of autotrophic and heterotrophic metabolism in Pseudomonas oxalatious. (Author)

AD-642 006 **Field 6M**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
SAMPLING SUBMICRON T1 BACTERIOPHAGE AEROSOLS,
by J. Bruce Harstad. 3 Jun 65, 11p
Availability: Published in Applied Microbiology v13 n6 p899-908 Nov 1965.

Descriptors: (*Bacteriophages, *Aerosols), Viability, Collecting methods, Tracer studies, Humidity, Liquid filters, Paper, Particle size, Samplers.

Liquid impingers, filter papers, and fritted bubblers were partial viable collectors of radioactive submicron T1 bacteriophage aerosols at 30, 55, and 85% relative humidity. Sampler differences for viable collection were due to incomplete physical collection (slippage) and killing of phage by the samplers. Dynamic aerosols of a mass median diameter of 0.2 microns were produced with a Dautrebande generator from concentrated aqueous purified phage suspensions containing extracellular soluble radioactive phosphate as a physical tracer. There was considerable destruction of phage by the Dautrebande generator; phage titers of the Dautrebande suspension decreased exponentially, but there was a progressive (linear) increase in tracer titers. Liquid impingers recovered the most viable phage but allowed considerable (30 to 48%) slippage, which varies inversely with the aerosol relative humidity. Filter papers were virtually complete physical collectors of submicron particles but were the most destructive. Fritted bubbler slippage was more than 80%. With all samplers, phage kill was highest at 85% relative humidity and lowest at 55% relative humidity. An electrostatic precipitator was used to collect aerosol samples for particle sizing with an electron microscope. The particle size was slightly larger at 85% relative humidity than at 30 or 55% relative humidity. (Author)

AD-642 007 **Field 6M, 14B**
Not available from CFSTI.
Army Biological Labs., Frederick, Md.
EVALUATION OF AN AUTOMATIC ELECTRONIC DEVICE FOR COUNTING BACTERIAL COLONIES,
by John E. Malligo. 16 Jun 65, 5p
Availability: Published in Applied Microbiology v13 n6 p931-4 Nov 1965.

Descriptors: (*Bacteria, *Counting methods), Electronic equipment, Automatic, Laboratory equipment, Calibration, Effectiveness, Serratia marcescens, Bacillus subtilis.

An automatic colony counter was tested extensively with colonies of two bacterial species, Serratia marcescens and Bacillus subtilis var. niger, grown on agar media. A stable relationship was established between machine counts and counts done visually by technicians. The calibration curve and estimates of the efficiency of the machine are presented and discussed. It is estimated that a 40% reduction in colony counting time is feasible through use of the machine. (Author)

N66-38192 **Field 6M**
CFSTI Prices HC$7.00 MF$2.00
Republic Aviation Corp., Farmingdale, N. Y.
DETERMINATION OF THE INDIGENOUS MICROFLORA OF MEN IN CONTROLLED ENVIRONMENTS FINAL REPORT, JUL. 1964 - NOV. 1965.
by D. Geib, P. E. Riely, and D. Shorenstein. Apr 66, 387p NASA-CR-78599, AMRL-TR-66-33
Contract NASA ORDER R-85, AF 33/615/-1814
387 P Refs

Descriptors: *Aerospace medicine, *Bacteria, *Hygiene, *Sanitation, Criterion, Degradation, Determination, Diet, Feces, Man, Medicine, Microbiology, Personal, Simulation, Skin, Space, Space travel.

For abstract, see STAR 04 23.

AD-641 427 **See Field 6E**

AD-641 749 **See Field 6O**

AD-641 752 **See Field 6O**

AD-641 769 **See Field 8A**

AD-641 933 **See Field 6E**

AD-641 939 **See Field 6L**

6O. PHARMACOLOGY

AD-641 379 **Field 6O**
Not available from CFSTI.
California Univ., Los Angeles. Brain Research Inst.

A NEUROPHYSIOLOGICAL COMPARISON OF ALPHA-CHLORALOSE WITH GAMMA-HYDROXYBUTYRATE IN CATS,
by W. D. Winters, and C. E. Spooner. 2 Aug 65, 10p
Grant AF-AFOSR-246-63
Proj. AF-7164
Task 716402
AFOSR-66-1138
Availability: Published in Electroencephalography and Clinical Neurophysiology v20 p83-90 1966.

Descriptors: (*Anesthetics, *Neurology), Electrophysiology, Nervous system, Electroencephalography, Convulsive disorders, Chloralose, Behavior, Dosage, Physiology, Pharmacology.

Identifiers: Convulsant drugs, Hydroxybutyrates.

The purpose of the paper is to identify and compare the various EEG and behavioral states induced by 15-65 mg/kg alpha-chloralose and 400-600 mg/kg gamma-hydroxybutyrate (GHB) in cats with chronically implanted electrodes. Observations were performed on EEG activity, gross behavior and averaged response to clicks. Both agents induce a dose related progression of EEG changes that commences with desynchrony, proceeds to several patterns of hypersynchrony, and finally advances to periods of spiking and isoelectric activity. The two drugs produce similar behavioral effects, except that alpha-chloralose induced myoclonic jerking occurs during a stage of EEG hypersynchrony, whereas that induced by GHB occurs later during the phase of EEG spiking. Averaged evoked responses to click are markedly increased in amplitude by both agents during the phases of EEG spiking. The gross behavior, EEG and evoked responses following both alpha-chloralose and GHB are characteristic of an epileptoid state rather than general anesthesia. (Author)

AD-641 381 **Field 6O**
Not available from CFSTI.
California Univ., Los Angeles. Brain Research Inst.
VARIOUS SEIZURE ACTIVITIES FOLLOWING GAMMA-HYDROXYBUTYRATE,
by Wallace D. Winters, and Charles E. Spooner. 1965, 8p
Grant AF-AFOSR-246-63
Proj. AF-7164
Task 716402
AFOSR-66-1120
Availability: Published in International Journal of Neuropharmacology v4 p197-200 1965.

Descriptors: (*Anesthetics, Neurology), Electrophysiology, Dosage, Convulsive disorders, Pharmacology, Nervous system, Physiology, Electroencephalography.

Identifiers: Hydroxybutyrates.

The studies demonstrate that 0.7-1.0 gm/kg of gamma-hydroxybutyrate (GHB) induces 2 1/2 c/s electrical epileptiform activity which progresses to spiking with short polyphasic bursts followed by electrical silence. Spontaneous and induced myoclonic jerks appear as the interval of electrical silence lengthens between bursts. Grand mal seizures are induced by tactile and/or auditory stimulation. The occurrence of epileptiform activity and in particular grand mal seizures following GHB suggests that a re-appraisal of the clinical usefulness of this drug is in order. (Author)

AD-641 527 **Field 6O, 6P**
Not available from CFSTI.
Texas Univ., Galveston. Dept. of Pharmacology.
THE EFFECTS OF GANGLIONIC BLOCKADE UPON THE PRESSOR RESPONSE ELICITED BY ELEVATION OF THE CEREBRAL SPINAL FLUID PRESSURE.
Interim rept.,
by J. G. Hilton, and M. Steinberg. 1965, 4p
Grant AF-AFOSR-391-63
Proj. AF-9777
Task 977701
AFOSR-66-1468
Availability: Published in Proceedings International Congress of Physiological Sciences (23rd), Tokyo p478 Sep 1965.

Descriptors: (*Cerebrospinal fluid, Blood pressure), (*Autonomic agents, Blood vessels), Vasoactive agents, Reflexes, Pressure, Parasympatholytic agents, Anesthesia, Dosage, Atropine.

Identifiers: Chlorisondamine.

The sensitivity of the ganglia to stimulation by the cholinergic agents neostigmine and pilocarpine after blocking drugs has led to a study of the effects of ganglionic blocking drugs upon a variety of vasomotor reflexes. This report concerns the effects of the reflex vasopressor response elicited by elevation of the cerebral spinal fluid pressure. Dogs were anesthetized with sodium pentobarbital and the arterial pressure was recorded from the brachial and femoral arteries, the venous pressure was recorded from the femoral vein. Alterations in vasomotor tone were measured using a modification of the major vessel occlusion technique of Bartelstone. Cerebral spinal fluid pressure was elevated via a needle placed directly into the cisterna magna. Vasomotor tone and blood pressure were measured in the absence and presence of an elevated cerebral spinal fluid pressure during the control period and after the intravenous injection of 1 mg/kg of the ganglionic blocking drug pressure produced by elevation of cerebral spinal fluid pressure. This alteration was blocked by the production of total spinal anesthesia or by the administration of small doses of atropine or similar parasympatholytic agents. (Author)

AD-641 749 **Field 6O, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Frederick, Md.
EFFECT OF SINGLE AND REPEATED TETRACYCLINE ADMINISTRATION ON THE PHAGOCYTIC FUNCTION OF RETICULENDOTHELIAL SYSTEMS,
by N. A. Kalinina, and G. Ya. Kivman. Aug 64, 7p Trans-1180
TT-66-62577
Trans. of Byulleten Eksperimentalnoi Biologii i Meditsiny (USSR), v55 n5 p84-7 1963.

Descriptors: (*Tetracyclines, *Reticulo-endothelial system), Dosage, Stimulation, Staphylococcus, Mice, Absorption (Biological), USSR.

It was previously established that single administration of chlortetracycline and oxytetracycline to white mice stimulates the absorptive function of the reticulo-endothelial system (RES) in several cases, depending on the dose of the preparation. Clinical use of tetracyclines is practically never restricted to single administration of the preparation; therefore it is important to know whether their stimulating effects on the RES are retained upon repeated administration. The effect of single and repeated administration of chlortetracycline, tetracycline, and oxytetracycline on the absorptive function of mouse RES were studied. (Author)

AD-641 752 **Field 6O, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Army Biological Labs., Fort Detrick, Md.
A METHOD OF DETERMINING SENSITIVITY OF RICKETTSIA BURNETI TO ANTIBIOTICS IN VITRO,
by E. P. Savitskaya. Aug 64, 11p Trans-1174
TT-66-62580
Trans. of Antibiotiki (USSR) v8 n6 p512-6 1963.

Descriptors: (*Rickettsia, *Antibiotics), Effectiveness, Tissue culture cells, In vitro analysis, Culture media, Chlortetracycline, Sensitivity, Dosage, Resistance (Biological), USSR.

A method was suggested for determining the activity of antibiotics with respect to Rickettsia Burneti in vitro in cells of chicken fibroblasts. The activity of the antibiotics is determined from the difference in the amount of cells intently affected by Rickettsia in the control culture and in the culture undergoing the action of antibiotics. The effect of antibiotics is manifest in a sizable reduction of the propagation of Rickettsia Burneti in the cytoplasm of fibroblasts, a reduction in number of Rickettsia-affected cells, and in the elimination of the cytopathogenic effect of Rickettsia on cells of tissue cultures. (Author)

AD-641 999 **Field 6O, 6E**
Not available from CFSTI.
Naval Medical Research Inst., Bethesda, Md.
4-HYDROXYBUTYRATE AS AN ANESTHETIC AGENT FOR THE RAT,
by Harvey W. Lyon, William R. Cotton, and James R. Lamb. 2 Feb 65, 3p
NAVMED-MR-005.19.6001-17
Availability: Published in Journal of Dental Research v45 n2 p417 Mar-Apr 1966.

Descriptors: (*Anesthetics, Rats), Dentistry, Surgery, Toxicity, Dosage.

Identifiers: Hydroxybutyrates.

Sodium 4-hydroxybutyrate has been used in over 120 consecutive procedures as an anesthetic agent for the albino rat without an anesthetic death. The dose rate was 1 mg/gm body weight administered intraperitoneally. Duration of anesthesia was 2 to 3 hours. Previously sodium pentobarbital in dosages of 25 to 30 mg/kg administered intraperitoneally resulted in frequent anesthetic deaths. (Author)

PB-173 462 **Field 6O, 6T**
CFSTI Prices: HC$1.00 MF$0.50
Mason Research Inst., Worcester, Mass.
TOXICOLOGIC EVALUATION OF ABBOTT CRYSTALLINE ANTIBIOTIC NSC-51954 (CLINICAL FORMULATION),
by Zareh Hadidian. 7 Feb 66, 13p
Grant PHS-PH-43-65-51

Descriptors: (*Cancer, Chemotherapeutic agents), (*Chemotherapeutic agents, Toxicity), (*Antibiotics, Toxicity), Heart, Dosage, Cardiovascular diseases, Blood pressure, Electrocardiography, Histology, Pathology, Hematology, Toxic tolerances, Dogs.

The toxicologic study of NSC-51954 was repeated with particular attention to the heart. In an earlier study (report submitted June, 1961) the compound was found to be lethal within 21 days to three out of three dogs at the daily dose level of 0.020 mg/kg. Lower dose levels of 0.010 and 0.005 mg/kg produced no hematologic or biochemical changes, and the dogs survived 28 days of treatment without obvious signs of intoxication. However, the histopathologic report at that time indicated many changes in various organs at all dose levels, the most alarming change being myocardial degeneration. In the present study no significant toxic effects were observed in either of the two animals: (1) neither animal lost weight; (2) there were no hematologic or biochemical changes; (3) there was no significant sustained lowering of blood pressure; (4) there was only one minor change in the electrocardiogram of one animal, a depression of the T-wave from day 10 on; (5) there were no physical changes indicative of intoxication; and (6) there were no significant gross or histopathologic changes in the organs and tissues of either animal. Tissue slides from the earlier study were submitted for examination to two pathologists neither of whom had been involved in the earlier study. They were in full agreement that there was no myocardial degeneration in the animals of the earlier study

receiving 0.010 mg/kg or less. That the compound is dangerous is testified by the fact that the difference between its lethal dose and apparently innocuous dose is only twofold. If more information is required about its prelethal effects, a fairly intensive investigation will have to be conducted at intermediate dose levels.

PB-173 466 **Field 6O, 6T**
CFSTI Prices: HC$3.00 MF$0.75
Mason Research Inst., Worcester, Mass.
ASSAY OF CARCINOGENICITY OF VARIOUS CHEMICALS. SUPPLEMENT I.
Final rept.,
by Zareh Hadidian, and Torgny N. Fredrickson.
15 Jul 65, 81p
Grant PHS-PH-43-63-525
See also PB-173 467.

Descriptors: (*Cancer, *Chemical compounds), Neoplasms, Dosage, Toxicity, Chemotherapeutic agents, Body weight, Histology, Liver, Spleen, Adrenal glands, Pituitary gland, Laboratory animals, Toxic tolerances, Etiology.

The toxicologic data are presented on which the selection of the dose levels for the final assay were based, along with the following information on each animal that was placed in the final study: (1) number of daily treatments, (2) survival days and whether the animal died or was sacrificed, (3) initial and final body weights, (4) type (s) of tumor found, verified by histologic examination, (5) nonneoplastic lesions found, and (6) the weights of the liver, spleen, adrenals and the pituitary. (Author)

PB-173 467 **Field 6O, 6T**
CFSTI Prices: HC$2.00 MF$0.50
Mason Research Inst., Worcester, Mass.
ASSAY OF CARCINOGENICITY OF VARIOUS CHEMICALS.
Final rept.
1 Nov 65, 44p
Grant PHS-PH-43-63-525
See also PB-173 466.

Descriptors: (*Cancer, *Chemical compounds), Laboratory animals, Experimental design, Research program administration, Toxicity, Toxic tolerances, Chemotherapeutic agents, Neoplasms, Dosage, Biopsy, Histology, Body weight, Etiology.

The objectives of this study were (1) to determine the chronic toxic and carcinogenic effects of several classes of chemicals and mixtures of chemicals and in the process (2) to gather information on the applicability of the experimental design used in this study to a variety of compounds of unknown toxicity and characteristics, for the purpose of developing a routine method for future studies of this type. (Author)

AD-641 568 **See Field 6S**

AD-641 794 **See Field 6E**

AD-641 826 **See Field 6A**

6P. PHYSIOLOGY

AD-641 353 **Field 6P**
Not available from CFSTI.
Defence Chemical Biological and Radiation Labs., Ottawa (Ontario).
TECHNIQUES FOR MEASUREMENT OF SWEATING RATES,
by Arthur C. Custance. 1966, 9p DCBRL-490
Availability: Published in Dermatology Digest v5 p55-69 Sep 1966.

Descriptors: (*Perspiration, Measurement), Sweat glands, Secretion, Biological stains, Test methods, Skin, Diagnostic agents, Diseases, Humans, Canada.

A brief survey of the commonly reported techniques for measuring sweating rates is given, and a short description of the technique developed over a period of some years in the author's laboratory is presented.

AD-641 373 **Field 6P**
Not available from CFSTI.
California Univ., Los Angeles. Brain Research Inst.
INTRA-ARTERIAL BLOOD PRESSURE RECORDING IN THE UNRESTRAINED CHICK DURING WAKEFULNESS AND SLEEP,
by C. E. Spooner, and W. D. Winters. 26 May 65, 10p
Grants AF-AFOSR-246-63, PHS-5TI-MH-6415
Proj. AF-9777
Task 977701
AFOSR-66-1465
Supported in part by grant PHS-MH-10836.
Availability: Published in Archives internationales Pharmacodynamie et de Therapie v161 n1 6p May 1966.

Descriptors: (*Sleep, *Blood pressure), Electroencephalography, Chickens, Electrophysiology, Recording systems, Behavior, Physostigmine.

Identifiers: Wakefulness.

The report describes a method of recording mean arterial blood pressure from the ischiatic artery of the unrestrained young chick. The mean arterial blood pressure of awake but quiet 6-14 day old chicks averaged 112 mm Hq. The chick blood pressure flucuations observed during states of wakefulness and sleep were comparable to those reported for mannalian species during similar behavioral states. Biphasic blood pressure fluctuations induced by the injection of eserine were not related to the drug induced EEG and behavioral sleeplike state. (Author)

AD-641 374 **Field 6P**
Not available from CFSTI.
California Univ., Los Angeles. Brain Research Inst.
COMPREHENSIVE SPECTRAL ANALYSIS OF HUMAN EEG GENERATORS IN POSTERIOR CEREBRAL REGIONS,
by D. O. Walter, J. M. Rhodes, D. Brown, and W. R. Adey. 31 Aug 66, 17p
Grants AF-AFOSR-246-63, PHS-NB-2501-04
Proj. AF-9777
Task 977701
AFOSR-66-1466
Supported in part by NAS-9-1970, NsG-505.
Availability: Published in Electroencephalography and Clinical Neurophysiology v20 p224-37 1966.

Descriptors: (*Electroencephalography, Analysis), Brain, Electrophysiology, Statistical analysis, Mathematical models, Programming (Computers), Frequency.

The complexity of human cerebral electrical activity has long frustrated its finer analysis, but recently developed mathematical models and computer technology have begun to remedy this situation. In this report some aspects of intracerebral electrical generation are illuminated by a novel extension of spectral analysis. The extension consists in performing many sequential spectral analyses, and producing suggestive visual transformations of spectral intensity and strength of spectral relationship as a function of both time and frequency. These contour maps and density plots give a broad overview of the stability, fluctuation, and evolution of patterns of wave generation and propagation in the EEG, which lead to a broadened conception of the familiar alpha wave, as well as to clear delineation of linear and non-linear transmission. (Author)

AD-641 415 **Field 6P**
Not available from CFSTI.
Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
COMPUTER MEASUREMENTS OF HIPPOCAMPAL FAST ACTIVITY IN CATS WITH CHRONICALLY IMPLANTED ELECTRODES,
by James C. Boudreau. 9 Aug 65, 19p
Proj. DA-3A014501B74C
Task 00
USAMRL-662
Availability: Published in Electroencephalography and Clinical Neurophysiology v20 p165-74 1966.

Descriptors: (*Electroencephalography, Analysis), Computers, Implants, Behavior, Electrophysiology, Cats, Nervous system, Physiology.

An evoked potential technique is described for implanting bipolar electrodes that straddle the dorsal hippocampal pyramical cell layer. Recordings from cats chronically implanted with this technique exhibited large amplitude theta and beta wave spontaneous activity. The beta waves seemed to be the product of a dipole generator located in the pyramidal cell layer. Computer analysis of records taken during the performance of a simple behavioral food response revealed a dominant beta rhythm of about 15 to 20 cps. This dominant beta wave varied within a fairly narrow frequency range for any one cat, with the modal frequency highly dependent upon the individual cat. The beta wave could be detected in both hemispheres and appeared to propagate in an anterior to posterior direction at a rate of less than one meter/sec. Consistent frequency changes occurred in the dominant beta wave when recordings were taken under different behavioral conditions. (Author)

AD-641 472 **Field 6P**
Not available from CFSTI.
Chile Univ., Santiago. Catedra de Fisiopatologia.
THE ELECTROCORTICOGRAM IN THE CHRONIC CERVEAU ISOLE CAT.
by Jaime Villablanca. 4 Jun 65, 15p
Grants AF-AFOSR-317-63, AF-AFOSR-62-392
Proj. AF-9777
Task 977701
AFOSR-66-0845
Availability: Published in Electroenceph. Clin. Neurophysiol. v19 p576-86 1965.

Descriptors: (*Electroencephalography, Behavior), Sleep, Sensory perception, Stimulation, Proprioception, Cats, Brain, Chile.

Identifiers: Wakefulness.

The EcoG of cerveau isole preparations was studied in 16 high mesencephalic, chronic cats which survived for an average of 48 days. Relationships were sought between ECoG and the level of behavioral arousal and with the electrical activity at the brain-stem caudal to the transection. In the acute stage, two ECoG patterns could be distinguished: spindle bursts or discontinuous slow waves; and continuous high voltage slow activity. Periods of high voltage, continuous slow synchronized rhythms alternated with ECD in the chronic preparation. These cyclical lapses exhibited electrocortical synchronization which closely resembled the ECoG of slow sleep in the normal cat. Olfactory stimulation desynchronized the ECoG according to stage of the ECSP during which stimulation was presented. Maximal desynchronization was observed during the onset stage of the ECSP. The EEG patterns of the cerveau isole showed no systematic relationship with the level of arousal of the animal, nor with the electrical activity in the brain-stem. However the effect of nociceptive and proprioceptive stimulation revealed the possibility of an extraneural pathway which affected the ECoG of the isolated cerebrum. The possibility of the existence in the forebrain of the cat of an autochthonous tonic, mechanism capable of independently evoking a cyclic alternation between wakefulness and slow sleep is discussed. (Author)

AD-641 474 **Field 6P**
Not available from CFSTI.
Chile Univ., Santiago. Catedra de Fisiopatologia.
OCULAR BEHAVIOR IN CHRONIC HIGH MESENCEPHALIC CATS,
by J. Villablanca. 1965, 3p
Grant AF-AFOSR-317-63
Proj. AF-9777
Task 977701
AFOSR-66-0844
Availability: Published in Abstracts of Papers presented at International Congress of Physiological Sciences (23rd), Tokyo, Japan Sep 1-9 1965.

Descriptors: (*Electroencephalography, Vision), Eye, Motion, Auditory signals, Respiration, Sleep, Cats, Brain, Chile.

Identifiers: Electromyography.

Pupil behavior and ocular movements were studied in chronic cats with mesencephalic transection rostral to the oculomotor nuclei; these events were correlated to the behavioral arousal of the animal, the EEG recorded at mesencephalic and pontine reticular formation, EMG, EKG, respiration. The findings are as follows: (1) Pupils are midriatic, nictitatings are retracted and slow movements of the eyes are present when the cat is awake. (2) A variable myosis and closure of the nictitatings is observed when the cat is lying down as if sleeping; pupils are extremely reactive to acoustic stimuli, there is no change of the EEG at brain stem level and the EMG activity is diminished. (3) An extreme myosis, protruded nictitatings, downward rotation of the eyeballs and phasic movements of the eyes, are seen while the cat displays a deep sleep episode; EMG is silent and reticular formation EEG shows phasic, grouped waves discharges; threshold of pupillary response to auditory stimuly is higher. It is concluded that in chronic precollicular cats: (1) Pupils are still active and their size is strictly related to the animals level of arousal. (2) Auditory stimuli powerfully inhibit tonus of the Edinger-Westphal's nuclei. (3) Since medium sized myotic pupils correlated to behavioral sleep are observed, it is postulated that decerebrate cats are not only able to display deep sleep, but also light sleep. (Author)

AD-641 475 **Field 6P**
Not available from CFSTI.
Chile Univ., Santiago. Catedra de Fisiopatologia.
MANIFESTACIONES OCULARES EN GATOS MESENCEFALICOS PRECOLICULARES CRONICOS (Ocular Behavior in Chronic High Mesencephalic Cats),
by Jaime Villablanca. 1 Mar 66, 6p
Grant AF-AFOSR-317-63
Proj. AF-9777
Task 977701
AFOSR-66-1461
Text in Spanish; Attached summary in English. See also AD-641 474.
Availability: Published in Journal Arch. Biol. Med. Exper. v3 p55-9 1966.

Descriptors: (*Vision, Electroencephalography), Sleep, Behavior, Brain, Eye, Rotation, Electrocardiography, Respiration, Auditory signals, Stimulation, Cats, Chile.

Identifiers: Wakefulness, Electromyography.

The following findings in chronic precollicular cats in which ocular manifestations were correlated to behavior, EEG as recorded at mesencephalic and pontine reticular formation, EMG, EKG and respiration, are reported. (1) Pupils were mydriatic, nictitatings and eyelids retracted and eyeballs symmetrically placed in the middle of the orbit, when the cat was awake. (2) A variable myosis and closure of the eyelids was observed when the cat was lying down as if sleeping. (3) An extreme myosis, protruded nictitatings, downward and inward rotation and phasic movements (REMs) of the eyeballs were seen while cats displayed a deep sleep episode; the EMG was silent and the reticular formation EEG showed phasic, grouped waves discharges; the threshold of pupilary response to auditory stimuli was higher. It is concluded that in chronic precollicular cats there occur pupil and ocular changes which are finely correlated with the sleep-wakefulness alternation and are independent of the sympathetic inervation of the pupil. These changes are in all similar to those occurring in intact, blinded cats. (8) This demonstrates that caudal brain stem structures are important in the control of pupil activity during sleep and may be exclusively responsible of ocular changes during deep sleep. (Author)

AD-641 515 **Field 6P**
Not available from CFSTI.
Navy Medical Neuropsychiatric Research Unit., San Diego, Calif.
THE EVOKED HEART RATE RESPONSE DURING SLEEP,
by David J. Hord, Ardie Lubin, and Laverne C. Johnson. 1966, 13p Rept. no. 65-24
Grants NSF-GB-922, NSF-GB-3961
NAVMED-MR005-12-2304
Availability: Published in Psychophysiology v3 n1 p46-54 1966.

Descriptors: (*Sleep, Pulse rate), Respiration, Stimulation, Auditory signals, Electroencephalography, Psychophysiology, Autonomic nervous system, Heart, Cardiovascular system.

Identifiers: Heart rate.

Heart rate responses evoked by a 3-sec auditory stimulus were averaged within stages of sleep for five subjects. Although there were some individual differences, the evoked HR response is generally diphasic, with the peak of the acceleratory component occurring on the fourth post-stimulus beat and the trough of the deceleratory component occurring on the 10th post-stimulus beat. Unlike other variables, which are depressed during the rapid eye movement (REM) stage, the HR response tends to be larger during the REM stage than during other stages of sleep. The size of the response is not appreciably affected by time of night, since HR is non-habituating during sleep, but is affected by the respiratory cycle phase, being largest when the stimulus occurs during inspiration or the period immediately prior to inspiration, and smallest when the stimulus occurs during the expiratory phase. (Author)

AD-641 524 **Field 6P, 5J**
Not available from CFSTI.
Florida Univ., Gainsville.
THE FIRST NIGHT EFFECT: AN EEG STUDY OF SLEEP,
by H. W. Agnew, Jr., Wilse B. Webb, and Robert L. Williams. 1964, 8p
Grant AF-AFOSR-395-63
Proj. AF-9778
Task 977801
AFOSR-66-1167
Prepared in cooperation with J. Hillis Miller Health Center, Gainsville, Fla.
Availability: Published in Psychophysiology v2 n3 p263-6 1966.

Descriptors: (*Sleep, Electroencephalography), Electrophysiology, Adaptation (Physiology), Psychophysiology.

Identifiers: Dreaming, Habituation, Electrooculography.

The electroencephalographic records from 43 young subjects who slept four consecutive nights in a laboratory environment were studied in an effort to describe the first night effect. These records showed that the first night of laboratory sleep contains more awake periods and less Stage 1-Rapid eye movement sleep. There is a delay in the onset of Stages IV and 1-REM and the sleep is more changeable. These effects rapidly adapt out by the second night. (Author)

AD-641 525 **Field 6P, 5J**
Not available from CFSTI.
Florida Univ., Gainesville. Dept. of Psychology.
THE SLEEP OF DEPRESSED PATIENTS,
by S. C. Gresham, H. W. Agnew, Jr., and Robert L. Williams. 2 Apr 65, 9p
Grant AF-AFOSR-395-63
Proj. AF-9778
Task 977801
AFOSR-66-1169
Availability: Published in Archives of General Psychiatry v13 p503-7 Dec 1965.

Descriptors: (*Sleep, *Psychoses), Electroencephalography, Psychiatry, Psychophysiology.

Identifiers: Electrooculography.

Eight depressed psychiatric inpatients were selected on the basis of six objective tests for this study. They were closely matched with normal controls. Both patients and controls were studied for four consecutive nights of sleep during which time the EEG and EOG were recorded. The patients obtained more wakefulness, less Stage 4 sleep, and showed a slightly longer sleep latency than the controls. Four patients studied again at discharge showed a decrease in all differences from the control values. (Author)

AD-641 840 **Field 6P, 6E**
Not available from CFSTI.
Army Medical Unit, Frederick, Md.
ALTERATIONS IN THYROID PHYSIOLOGY DURING PNEUMOCOCCAL SEPTICEMIA IN THE RAT,
by George E. Shambaugh, III, and William R. Beisel. 15 Nov 65, 13p
Availability: Published in Endocrinology v79 n3 p511-23 Sep 1966.

Descriptors: (*Thyroid gland, Infections), (*Diplococcus pneumoniae, Thyroid gland), Diseases, Rats, Bacteria, Blood, Toxins + antitoxins, Iodine, Labeled substances, Thyroid hormones, Stimulation, Thyroxine, Biological assay, Radioactive isotopes, Pituitary gland.

The impact of acute infection on thyroid physiology was investigated in rats infected with a type-specific pneumococcus. Infected rats showed a lower thyroidal 131I uptake than healthy controls at all time periods studied. Unlike in the rat, thyroidal 131I uptake curves in the infected and healthy mouse and guinea pig were superimposable. Thyroidal 131I release in the infected rat was significantly delayed when compared to similar release curves in uninfected animals. Although the thyroid of the infected rat responded to a physiologic dose of exogenous TSH, both its uptake and release of 131I showed an absolute reduction. Serum TSH levels measured by bio-assay were not altered during infection. The disappearance time of 131I-T4 from blood of infected rats was significantly shorter than that of healthy controls, while disappearance times of blood 131I-T3 were unchanged. Organ radioactivity was measured following serial sacrifice after the administration of 131I-T4 or 131I-T3 to healthy and infected rats. In the T4 group radioactivity in livers from infected rats was consistently lower than in healthy animals. (Author)

AD-641 871 **Field 6P, 6A**
Not available from CFSTI.
State Univ. of New York, Stony Brook. Coll. of Engineering.
ENZYME AMPLIFIER KINETICS,
by Sumner N. Levine. 6 Jan 66, 5p
Grant AF-AFOSR-667-64

Proj. AF-9749
Task 974901
AFOSR-66-1208
Availability: Published in Science v152 n3722 p651-3 Apr 29 1966.

Descriptors: (*Enzymes, Reaction kinetics), Amplifiers, Gain, Models (Simulations), Equations, Chemical equilibrium, Theory.

Identifiers: Enzyme amplifiers.

Enzyme amplifier systems have been implicated in such diverse physiological phenomena as vision and blood coagulation. Such systems are considered from a general point of view and the concept of steady state gain of the enzyme amplifier is introduced. Expressions for the latter are obtained, and several of the main factors influencing gain are discussed. The effect of the duration of the activation on the characteristics of the response is discussed, and the influence of small changes in the rate constants on the steady state gain is considered. (Author)

AD-641 885 **Field 6P**
Not available from CFSTI.
Buenos Aires Univ. (Argentina). Instituto de Anatomia General y Embriologia.
IONIC MECHANISM ASSOCIATED WITH NON-CHOLINERGIC SYNAPTIC INHIBITION IN MOLLUSCAN NEURONS.
by H. M. Gerschenfeld, and D. J. Chiarandini. 7 Dec 64, 17p
Grant AF-AFOSR-656-64
Proj. AF-9777
Task 977701
AFOSR-66-1124
See also AD-623 368.
Availability: Published in Journal of Neurophysiology v28 p710-23 1965.

Descriptors: (*Mollusca, Nerve cells), Electrochemistry, Electrophysiology, Nervous system, Inhibition, Ions, Permeability, Membranes (Biology), Electrolytes (Physiology), Ganglia, Nerve impulses, Chlorides, Potassium, Argentina.

The ionic basis of the non-cholinergic inhibitory postsynaptic potential (IPSP) in DInhi neurons of the snail Cryptomphallus aspersa was analyzed by intracellular recording. It has been found that the increase in the intracellular concentration of Cl (-) does not modify either the IPSP or its equilibrium potential. When the external concentration of K was zero it was observed an increase in both the IPSP's amplitude and equilibrium potential value. It is concluded that the non-cholinergic IPSP's are due to an increase of the subsynaptic membrane permeability that allows a selective efflux of K (+) down its electrochemical gradient. (Author)

N66-32697 **Field 6P**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
ON THE DYNAMICS OF CAPILLARIES AND THE EXISTENCE OF PLASMA FLOW IN THE PERICAPILLARY LYMPH SPACE.
by J. T. Howe, and Y. S. Sheaffer. Aug 66, 46p NASA-TN-D-3497
Presented At The Intern. Symp. On The Human Capillary Circulation, Jamaica, West Indies, 1966

Descriptors: *Blood flow, *Capillary circulation, *Hydrodynamic equation, *Lymph, Analysis, Annulus, Blood, Capillary, Circulation, Dynamics, Equation, Flow, Hematocrit, Hydrodynamics, Organ, Permeability, Physiology, Plasma, Pressure.

For abstract, see STAR 04 19.

N66-33444 **Field 6P**
CFSTI Prices HC$3.00 MF$0.50
Hazleton Labs., Falls Church, Va.
LIFE DETECTION SUBSYSTEM PROGRESS REPORT NO. 1.
by G. R. Perez, and E. Usdin. Jul 66, 55p NASA-CR-77032
Contract NASR-10

Descriptors: *Extraterrestrial life, *Life detector, *Metabolism, *Phosphate, *Sulfur, Assay, Biochemistry, Biological, Cell, Design, Detector, Extraterrestrial, Instrumentation, Isotope, Life, Liquid, Photomultiplier, Processing, Radioactivity, Readout, System, Tube.

For abstract, see STAR 04 19.

N66-37775 **Field 6P**
CFSTI Prices HC$3.00 MF$1.00
Biosystems, Inc., Cambridge, Mass.
VISUAL AND CONTROL ASPECTS OF SACCADIC EYE MOVEMENTS.
by L. Stark, L. R. Young, and B. L. Zuber. Sep 66, 143p NASA-CR-564
Contract NAS2-1328

Descriptors: *Eye movement, *Human behavior, *Physiological response, *Visual system, Control, Dead, Jump, Mechanism, Model, Muscle, Ocular, System, Visual, Zone.

For abstract, see STAR 04 23.

N66-37776 **Field 6P**
CFSTI Prices HC$4.25 MF$2.00
Biosystems, Inc., Cambridge, Mass.
BIOLOGICAL CONTROL SYSTEMS - A CRITICAL REVIEW AND EVALUATION.
by P. G. Katona, L. Stark, A. Taub, R. Taub, and L. R. Young. Sep 66, 395p NASA-CR-577
Contracts NAS2-2122, NAS2-1372

Descriptors: *Biological model, *Control system, *Human body, Cardiovascular, Control, Feedback, Fluid, Instrumentation, Lens, Mathematics, Pupil, Review, Skin, System, Vestibular, Volume.

For abstract, see STAR 04 23.

N66-38228 **Field 6P, 6C**
CFSTI Prices HC$2.00 MF$0.50
Louvain Univ. (Belgium). Cardiopulmonary Lab.
BEAT TO BEAT REGULATION OF THE PULMONARY CIRCULATION IN CONSCIOUS DOGS. THE EFFECTS OF NORMAL RESPIRATION.
by A. A. Charlier. 30 Nov 64, 41p SR-1, AD-636692
Contract AF 61/052/-738

Descriptors: *Dog, *Pulmonary circulation, *Respiration, Artery, Blood, Circulation, Effect, Heart, Lung, Pressure, Pulse, Rate, Volume.

For abstract, see STAR 04 23.

AD-641 527 **See Field 6O**

AD-641 573 **See Field 6A**

AD-641 699 **See Field 5J**

PB-173 453 **See Field 20D**

6R. RADIOBIOLOGY

AD-212 660 **Field 6R**
CFSTI Price: HC$3.60
Defense Atomic Support Agency, Washington, D. C.
A RATE PROCESS THEORY OF THERMAL INJURY,
by Charles H. Fugitt. 6 Dec 55, 38p DASA-606

Descriptors: (*Burns, *Radiation injuries), Mathematical analysis, Pathology, Theory, Thermodynamics.

A derivation of the basic rate process equations is made for the purpose of illustrating the thermodynamic principles and requirements underlying, and the limitations imposed upon, the use of such equations. Theoretical presentations are made depicting the simultaneous reaction of two different (but similar) chemical substances in the same system. Data obtained by Dr. George Mixter of the University of Rochester, pertaining to cutaneous radiant energy burns in living pigs, are analyzed by means of the two-component thermal degradation process theory derived herein, and empirical equations deduced which are believed to be useful in predicting biological injury resulting from thermal radiation burns in terms of the parameters time and irradiance. The usefulness of these equations is limited to constant intensity exposures of one to thirty seconds duration. Some hypotheses regarding the complex mechanism of thermal degradation of the skin are offered in the Conclusion.

AD-641 331 **Field 6R, 5J, 6C**
CFSTI Prices: HC$2.00 MF$0.50
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
PERFORMANCE OF RHESUS MONKEYS DURING CONTINUOUS LOW-LEVEL GAMMA RADIATION: AN EXPLORATORY STUDY.
Interim rept.,
by Robert G. Braun, Donald N. Farrer, William Zappini, and Guy H. Crook, 11 Oct 66, 29p ARL-TR-66-18
Proj. AF-6893
Task 689302

Descriptors: (*Radiation effects, *Behavior), Monkeys, Gamma rays, Reaction (Psychology), Auditory signals, Performance tests, Motivation, Reflexes, Learning, Radiological dosage, Blood counts, Leukocytes, Radiation tolerance.

Six rhesus monkeys, two males and four females weighing 4.8 to 5.3 kg. were trained to perform four operant tasks (Continuous Avoidance, Response Time Following an Auditory Cue, Response Time Following a Visual Cue and a Fixed Ratio Task). Baseline performance was obtained in the laboratory during a 30-day simulated exposure situation. The exposure phase involved a 10-day pre-exposure baseline, 10 days of continuous exposure to 2r per hour gamma radiation, and a 10-day post-exposure follow-up assessment of performance. A 30-day follow-up was also conducted 60 days following the exposure phase. No performance diminutions were discovered on the aversively motivated tasks, but a performance diminution in the food rewarded fixed ratio task occurred during the radiation exposure. All the animals recovered shortly after the exposure and still appeared normal 8 months later. (Author)

AD-641 505 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Brooke General Hospital, Fort Sam Houston, Tex.
CHROMOSOMAL DAMAGE IN HUMANS PRODUCED BY X-IRRADIATION.
Annual progress rept.,
by Jose M. Louro. 1966, 21p

Descriptors: (*Chromosomes, *Radiation injuries), (*Radiation effects, Chromosomes), X rays, Leukocytes, In vivo analysis, Radiotherapy, Experimental design, Culture media, Biological stains, Blood counts, Mutations, Mitosis, Lymphocytes, Humans.

The chromosomes of peripheral leucocytes in subjects exposed to more than 2500 R of x-irradiation were compared with those of normal, healthy

individuals and several other subjects not exposed to x-irradiation. The results revealed that in the irradiated group there was a marked increase in aneuploidy, polyploidy, endoreduplication and structural chromosomal damage. (Author)

AD-641 654 **Field 6R**
CFSTI Prices: HC$3.00 MF$0.75
General Dynamics/Fort Worth, Tex.
DEVELOPMENT OF A HIGH-INTENSITY SOLID-STATE GAMMA-RAY DOSIMETER SYSTEM.
Final technical rept.,
by C. L. Fletcher. 18 Jul 66, 63p FZK-287
Contract N228 (62479)67947
Task CS452
USNRDL-TRC-53

Descriptors: (*Dosimeters, Gamma rays), (*Semiconductor devices, Dosimeters), Silicon, Solid state physics, Dose rate.

Design, construction, and testing of an integrating gamma-ray dosimeter for high dose rates are discussed. The sensor is a silicon surface-barrier detector operating as a current device. The detector output current is integrated on a capacitor. When the voltage on the capacitor rises to a predetermined level corresponding to 10 rad-equivalent-air of gamma-ray dose, the capacitor is discharged and the instrument produces an output pulse to signal the event. The number of output pulses indicates integrated dose, and the pulse repetition rate indicates dose rate. The detector proper is cooled with a thermoelectric cooler to minimize and stabilize leakage current. The instrument is designed for operation in the dose-rate range of 10 to 100,000 rad-equivalent-air per second. The detector is constructed to make it function as a Bragg-Gray device over the gamma-ray energy range of 80 kev to 12 Mev. The detector is reasonably isotropic; cumulative errors due to all causes are less than plus or minus 30%. The electronics are insensitive to gamma-radiation transients for dose rates as high as 1,000,000 rad per second. Results of tests with radioactive sources, a fast-burst reactor, and bremsstrahlung pulses are given. (Author)

AD-641 880 **Field 6R**
CFSTI Prices: HC$2.00 MF$0.50
Army Medical Research Unit., Europe.
IONIZING RADIATION, INJURY, PREVENTION AND TREATMENT.
Annual progress rept.,
by William E. Rothe, Frank C. Leitnaker, and James L. Butterfield.Jul 66, 37p
Proj. DA-3A025601A824
See also AD-626 384.

Descriptors: (*Radiation injuries, Tissues (Biology)), Radioactive fallout, Radiological contamination, Radiation effects, Milk, Cancer, Thyroid gland, Blood, Preservation, Radioactive isotopes, Cesium, Iodine, Potassium, Humans, Urine, Alpha counters, Gamma counters, Military personnel.

Simple but accurate and sensitive techniques have been established for total alpha counting of tissue and urine specimens and for I-131 quantitation in whole milk. Results are reported. Studies of Lean Body Mass (LBM) changes with physical conditioning have continued. Studies of blood preservation have been refined.

PB-173 384 **Field 6R, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
DESCRIPTION D'UN DISPOSITIF PERMETTANT LA CONTAMINATION D'ANIMAUX DE LABORATOIRE PAR INHALATION D'AERODOLS RADIOACTIFS (Device for Contaminating Laboratory Animals by Inhalation of Radioactive Aerosols),
by Michele Lutz, and Huguette Rouvroy. Oct 66, 31p CEA-R-3086
Text in French; Attached summary in English.

Descriptors: (*Laboratory animals, *Radiological contamination), (*Aerosols, Radioactive isotopes), Laboratory equipment, Design, Respiration, Health physics, Plutonium compounds, Dioxides, Particle size, Lungs, Radiation effects, Histology, Autoradiography, France.

The contamination enclosure is made up of a sphere to which are attached an aerosol generator, containers adapted to the animals to be used, and the atmospheric sampling system. The sphere is placed in a protective glove-box, the latter being itself protected by an introduction chamber fitted with locking access lids. A detailed description is given of the working principle. As an example, some results are given concerning the contamination of rats by a plutonium oxide aerosol: characteristics of the powder (mean diameter 0.50 microns - standard deviation : 1.4), examination and evolution of the atmospheric activity as a function of time, evaluation of the retention by the lungs by means of histological and autoradiographic examinations. (Author)

6S. STRESS PHYSIOLOGY

AD-641 352 **Field 6S, 5J, 20A**
Not available from CFSTI.
Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
EFFECTS OF SONIC BOOM ON PEOPLE: REVIEW AND OUTLOOK,
by Henning E. von Gierke. 3 Nov 65, 12p
AMRL-TR-65-195
Proj. AF-7231
Task 723103
Availability: Published in Journal of Acoustical Society of America v39 n5 pt2 pS43-50 May 1966.

Descriptors: (*Sonic boom, Tolerances (Physiology)), (*Psychoacoustics, Sonic boom), Stress (Physiology), Stress (Psychology), Pressure, Noise, Thresholds (Physiology), Vibration, Social psychology, Reviews, Symposia.

The report reviews the history of observations on human reactions to the sonic boom from the time when the boom was a demonstration curiosity to the present day where reaction of the population to the sonic boom is a scientific problem of technical, economic, social, and political consequences at the national and international level. The field programs conducted by the USAF and NASA over the last 15 years and over the last 5 years by the FAA were all of limited scope with respect to exploring direct and indicrect physiological and psychological human reactions to sonic booms of different intensity and exposure frequency. Although the data accumulated might be adequate to decide on preliminary stopgap exposure criteria, it is obvious that a broader approach to the problem is required. Laboratory work in support of these questions has hardly been started. Neither conventional acoustic and vibration generators for boom-type stimulation nor special equipment for high-fidelity sonic-boom simulation have been fully utilized. Some of the open questions and possible approaches are discussed as part of a broad, long-range research program required to come up with scientific data as bases for operational sonic-boom exposure criteria. (Author)

AD-641 418 **Field 6S, 5J**
Not available from CFSTI.
Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
CONCOMITANT VISUAL STIMULATION DOES NOT ALTER HABITUATION OF NYSTAGMIC, OCULOGYRAL OR PSYCHOPHYSICAL RESPONSES TO ANGULAR ACCELERATION,
by James H. Brown, and George H. Crampton. 9 Apr 65, 22p
Proj. DA-3A014501B71P
Task 08
USAMRL-664
Availability: Published in Acta oto-laryng v61 p80-91 1965.

Descriptors: (*Nystagmus, *Acceleration tolerance), Vestibular apparatus, Psychophysiology, Stimulation, Vision, Test methods.

Identifiers: Habituation.

Concomitant visual stimulation, varied between four groups of 20 young men each from total darkness to full room illumination, was introduced on habituation trials that were interpolated between test trials. Although highly significant decrements for nystagmic, oculogyral and psychophysical responses were found with repeated testing, the different visual conditions in no way altered this habituation. (Author)

AD-641 566 **Field 6S, 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
VIRAL ANTIBODY PRODUCTION IN ANIMALS EXPOSED TO A SPACE CABIN ENVIRONMENT.
Progress rept. Jul-Sep 65,
by David J. Giron, and Jerome P. Schmidt. Sep 66, 11p SAM-TR-66-82
Proj. AF-7753
Task 775302

Descriptors: (*Antigens + antibodies, Biosynthesis), (*Space medicine, Antigens + antibodies), (*Space simulation chambers, Antigens + antibodies), Vaccinia virus, Rabbits, Acclimatization, Immunity, Chromatographic analysis, Space biology.

Synthesis of antibody against vaccinia virus was investigated in rabbits exposed to a simulated space cabin environment. The atmospheric pressure in the cabin was equivalent to an altitude of 18,000 feet; the partial pressure of oxygen was approximately that of sea level. The animals were acclimatized for 7 days and then immunized with a series of injections of purified vaccinia virus over a period of 5 weeks. Control animals remained at ground level and received identical injections from the same virus pool. Specific antibody produced by each group was tested for its neutralization titer and distribution of specific activity in fractions separated by column chromatography and sucrose gradients. No qualitative or quantitative differences in antibody produced were noted. (Author)

AD-641 568 **Field 6S, 6O**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
METHIONINE-PYRIDOXINE AND AIRSICKNESS.
Final rept., Jul 63-Sep 65,
by Harry H. Malvin. Oct 66, 11p SAM-TR-66-87
Task 775505

Descriptors: (*Motion sickness, Aviation medicine), (*Antimotion sickness agents, Effectiveness), Methionine, Vitamin B complex, Pharmacology.

The paper presents two observations made incidental to a series of unsuccessful experiments which were designed to study individual variation of response to stimuli intended to induce airsickness. The first observation suggests that capsules containing 50 mg. l-methionine and 50 mg. pyridoxine, when administered initially and midway during a 4-hour flight, have a limited ability to protect human volunteers against motion sickness. The second observation identifies a structural similarity between the therapeutically effective antimotion sickness agents, neurochemical transmitters, and the peptide linkage. (Author)

AD-641 569 Field 6S
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF DIFFERENT INERT GASES AND LOW PRESSURE NORMOXIC ENVIRONMENTS ON OXYGEN UPTAKE IN MICE.
Final rept., Nov 64-Jan 66,
by William E. Pepelko. Oct 66, 11p SAM-TR-66-84
Task 775801

Descriptors: (*Helium group gases, Metabolism), Oxygen consumption, Barometric pressure, Low-pressure research, Body temperature, High altitude, Thermal conductivity, Mice.

Exposure of adult male Swiss albino mice to air at 28C., ground level pressure, for 24 hours resulted in an oxygen uptake of 78.0 ml./hr. (STPD) as compared with 77.4 ml./hr. in 100% oxygen, 77.7 ml./hr. in 80% Ar:20% O2, and 84.2 ml./hr. in 80% He:20% O2. The increase in oxygen consumption in He:O2 at this temperature approached significance ($P < .10$). With another group of mice, oxygen consumption during 3-hour exposures to 80% He:20% O2 at 32C. was 88.5 ml./hr. as compared with 90.2 ml./hr. in air. These differences were not significant. With a third group of mice, exposure to 100% oxygen at 226 mm. Hg (absolute) at 28C. for 3 hours resulted in an oxygen consumption of 89.7 ml/hr. as compared with 88.8 ml./hr. in air at ground level pressure. Differences again were not significant. It was concluded that the metabolic stimulating effect of helium at 28C. was a result of its high thermal conductivity, and at 32C. (skin temperature) this effect was no longer apparent. Changes in barometric pressure had no effect on oxygen consumption. (Author)

AD-641 570 Field 6S
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
SOME CARDIOVASCULAR RESPONSES IN ANESTHETIZED DOGS DURING REPEATED DECOMPRESSIONS TO A NEAR-VACUUM,
by Julian P. Cooke, and Richard W. Bancroft. Oct 66, 17p SAM-TR-66-88
Task 775801

Descriptors: (*Decompression, *Cardiovascular system), Heart, Tolerances (Physiology), Anoxia, Blood pressure, Stress (Physiology), Arrhythmia, Pathology.

Repeated, rapid decompressions of anesthetized dogs from ambient pressures of 250 or 200 mm. Hg abs. within 1 second to approximately 1 mm. Hg, followed by exposures from 55 to 240 seconds before recompression, carried out within a 4-hour period, have shown that the hearts of most animals tolerate such exposures well. A progressively severe degree of bradycardia was proportional to the length of each anoxic exposure. Following initial and repeated decompressions, the customary subatmospheric pressure in the superior vena cava was elevated to 60 or 70 mm. Hg within 2 seconds, and the arterial pressure approached comparable values within 4 to 10 seconds. To a great degree, former predecompression values were restored upon recompression as barometric pressure surpassed that of water vapor. A temporary high arterial and pulse pressure resulted in most animals after recompression, with a gradual return within 5 to 10 minutes. A surge of positive tracheal pressure occurred concurrently with each decompression, remaining slightly positive while the barometric pressure was below that of water vapor. Responses were similar in many respects to those following decompressions to 30 mm. Hg, although at vacuum conditions vaporization and outgassing effects become maximum. All such exposures are potentially dangerous and the possibility of cardiac damage, even for a short exposure, is ever present. Failure to survive such exposures, however, appears to be more dependent on damage to vital structures other than the heart. (Author)

AD-641 804 Field 6S
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
THE STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. IX. NUTRITIONAL EVALUATION OF FEEDING BITE-SIZE FOODS.
Interim rept. Oct-Dec 65,
by John E. Vanderveen, Normon D. Heidelbaugh, and May J. O'Hara. 1966, 8p SAM-TR-66-243
Proj. AF-7758
Task 775803
See also AD-641 830, AD-641 817.
Availability: Published in Aerospace Medicine v37 n6 p591-4 Jun 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Helium, Toxicity), (*Oxygen, Toxicity), (*Diet, *Space medicine), Food, Beverages, Nutrition, Space simulation chambers, Ingestion (Physiology), Excretion.

A feeding system composed of beverages and bite-size foods proves to be capable of providing sustenance for long-term space missions. The fat coatings presently used to maintain the integrity of bite-size foods is poorly utilized and may be the factor responsible for frequency of defecations. The development of new coatings for bite-size foods is necessary before an all bite-size feeding system can be recommended for manned space flights. (Author)

AD-641 805 Field 6S
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. V. EXERCISE PERFORMANCE AND CARDIOVASCULAR RESPONSE,
by Howard J. Zeft, William G. Robertson, and B. E. Welch. 1966, 10p SAM-TR-66-252
Proj. AF-7930
Task 793002
See also AD-641 806, AD-641 829.
Availability: Published in Aerospace Medicine v37 n6 p566-71 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Exercise, *Space medicine), Space simulation chambers, Tolerances (Physiology), Oxygen consumption, Cardiovascular system, Stress (Physiology).

Identifiers: Orthostasis.

Four healthy Air Force crew members participated in an experiment to evaluate an oxygen-helium environment at 258 mm Hg for future manned space flights. For three weeks prior to entering the space cabin simulator, the subjects took part in a program of physical exercise on a Collins bicycle ergometer. During the 56 days of the atmosphere test, they exercised 6 days per week on the same bicycle ergometer with 3 daily 20-minute exercise periods. Each exercise period was graded with a warm-up, moderate load (pulse, 150-160/min), and heavy load (pulse, 170-180/min). The workloads were determined prior to the subjects entering the chamber and remained constant. Pulse rates during moderate and heavy exercise revealed an initial fall, corresponding to conditioning and increased efficiency with the ergometer. Subsequently, these parameters leveled off except for one subject who showed a minimal rise in pulse rates during the latter half of the confinement period. Stress testing was performed immediately before and after the atmosphere test phase. Treadmill times (Balke test) showed slight improvement in the post-experimental period. Maximum oxygen consumption measurements on the bicycle ergometer post-experimentally were diminished by 2.9 to 9.4 ml/min/kg from initial values. Changes in plasma volume (pre- to post- test) ranged from -143cc to ;222 cc. Tilt-table studies showed little change from earlier tests with no syncopal symptoms. It was felt that the programmed daily exercise was adequate in preventing a significant deconditioning effect or orthostatic intolerance. (Author)

AD-641 806 Field 6S
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. IV. SELECTED BLOOD ENZYME RESPONSE,
by M. J. Bartek, Frode Ulvedal, and H. E. Brown. 1966, 8p SAM-TR-66-246
See also AD-641 818, AD-641 805.
Availability: Published in Aerospace Medicine v37 n6 p563-6 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Enzymes, *Space medicine), Erythrocytes, Hemopoietic system, Oxidoreductases, Glutathione, Hematocrit, Tolerances (Physiology), Space simulation chambers.

An oxygen-helium atmosphere at a total pressure of 258 mm. Hg was evaluated for 56 days with 4 normal subjects to determine what effects it had on a selected group of serum enzymes and on enzyme-mediated erythropoietic mechanisms. Weekly serum lactic dehydrogenase, lactic dehydrogenase isozymes, glutamic dehydrogenase and lipase determinations were made as well as hematocrit, erythrocyte glucose-6-phosphate dehydrogenase, glutathione and glutathione stability measurements. A 14 per cent decrease in lactic dehydrogenase was observed, as well as a slight decrease in the 'heart' isozyme during the experimental period. Glutamic dehydrogenase remained well within the normal range and lipase was not detected. There was a 3.4 per cent decrease in hematocrit during the post-experimental period, with an accompanying slight increase in glucose-6-phosphate dehydrogenase, glutathione and glutathione stability. Considering that all values obtained were well within the normal range, man appears to tolerate this atmosphere quite well. (Author)

AD-641 807 Field 6S
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
THE STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. XIII. BEHAVIOR FACTORS,
by David W. Rodgin, and Bryce O. Hartman. 1966, 8p SAM-TR-66-247
Proj. AF-7930
Task 793002
See also AD-641 816.
Availability: Published in Aerospace Medicine v37 n6 p605-8 Jun 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Helium, Toxicity), (*Oxygen, Toxicity), (*Behavior, *Space medicine), Psychomotor tests, Sleep, Adaptation (Physiology), Exercise, Confined environments, Space simulation chambers.

Four officer aircrewmen performed psychomotor tests 3 times daily and reported on sleep once a day during a 56-day exposure to an oxygen-helium atmosphere at 258 mm Hg total pressure. Psychomotor and sleep changes were minimal and essentially benign. Adaptation to altered schedules was generally good except for persistent complaints about sleep (not fully supported by sleep histories) from one subject. The tempo of activity and physical exercise regimen apparently prevented behavioral manifestations of deconditioning frequently seen in confinement studies. (Author)

AD-641 816 **Field 6S**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. XI. ORAL, CUTANEOUS, AND AEROSOL BACTERIOLOGIC EVALUATION,
by James E. Moyer, Dorothy Farrell, W. L. Lamb, and J. L. Mitchell. 1966, 8p SAM-TR-66-244
Proj. AF-7930
Task 793001
See also AD-641 817, AD-641 807.
Availability: Published in Aerospace Medicine v37 n6 p597-600 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Bacteria, *Space medicine), Mouth, Skin, Bacterial aerosols, Closed ecological systems, Space simulation chambers, Staphylococcus aureus, Throat, Paranasal sinuses.

Studies were initiated to determine the numbers, distribution, and types of microorganisms encountered under conditions of a sealed environment for extended periods of time, such as would occur during space explorations. A 56-day experiment, utilizing four test subjects confined within a double-walled test cell in an oxygen-helium atmosphere at 258 mm. Hg, was performed. Quantitative counts of the aerobic microorganisms present in the circulating atmosphere as well as those present on the skin of the subjects were established. Distribution of coagulase positive, phage typable Staphylococcus aureus strains and predominant microbial types in throat, nasal, skin and aerosol smaples were determined. Evidence of a staphylococcal transfer between subjects was obtained. Implications of these findings, as related to the utilization of the two-gas atmosphere for future space flights, are discussed. (Author)

AD-641 817 **Field 6S**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. X. ENTERIC MICROBIAL FLORA,
by Joseph T. Cordaro, Walter M. Sellers, J. Ball, and Jerome P. Schmidt. 1966, 7p SAM-TR-66-215
Proj. AF-7753
Task 775302
See also AD-641 804, AD-641 816.
Availability: Published in Aerospace Medicine v37 n6 p594-6 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Enterobacteriaceae, *Space medicine), Diet, Excretion, Space simulation chambers.

Identifiers: Feces.

One hundred twenty-four fecal samples collected during various phases of the study were examined to determine any changes which may have occurred in the bacterial flora. The counts of all microorganisms remained within the normal range except those for the enterococci. There was a decrease in the number of enterococci as the subjects went on the experimental diet, but the values returned to normal as the regular diet was resumed after the 56-day flight. The change observed was not considered to be of clinical significance. (Author)

AD-641 818 **Field 6S**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. III. RENAL RESPONSE,
by H. V. Glatte, and C. L. Giannetta. 1966, 8p SAM-TR-66-250
See also AD-641 819, AD-641 806.
Availability: Published in Aerospace Medicine v37 n6 p559-62 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Kidneys, *Space medicine), Kidney function tests, Acid-base equilibrium, Tolerances (Physiology), Space simulation chambers, Blood chemistry, Urine.

To assess the effects of helium on renal function, four healthy Air Force officers lived for 56 days in a space cabin simulator with a partial pressure of oxygen of 175 mm. Hg and helium of 74 mm. Hg at a total pressure of 258 mm. Hg. All renal parameters measured during the control and experimental periods failed to reveal any deviation from accepted normals. Studies performed included renal hemodynamics utilizing inulin, PAH, and endogenous creatinine clearances; concentrating and diluting tests; and 24-hour urinary excretion of proteins. In addition, multiple determinations of blood pH and standard bicarbonate utilizing a modified Astrup technique were normal. It was concluded that the experimental atmosphere had no adverse effect on renal function. (Author)

AD-641 819 **Field 6S**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. II. MAJOR AND MINOR ATMOSPHERIC COMPONENTS,
by J. D. Adams, James P. Conkle, William E. Mabson, Jack T. Watson, and Patricia H. Wolf. 1966, 8p SAM-TR-66-253
Proj. AF-7930
Task 793002
See also AD-641 820, AD-641 818.
Availability: Published in Aerospace Medicine v37 n6 p555-8 Jun 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Gas analysis, Atmosphere), Space medicine, Respiration, Tolerances (Physiology), Space simulation chambers.

The atmosphere to which four human volunteers were exposed for 56 days during a study designed to describe the effects of oxygen-helium on man was analyzed for major and minor constituents. The partial pressure of the major constituents, oxygen (175.2 plus or minus 2.4 mm Hg) and helium (73.9 plus or minus 2.3 mm Hg), remained within the established experimental parameters. Sixty-eight minor constituents were detected. The concentration of these compounds remained below a level thought to cause a physiologic effect. The instrumental methods employed were sufficient for a comprehensive analysis of the synthetic atmosphere. (Author)

AD-641 820 **Field 6S**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE. I. INTRODUCTION AND GENERAL EXPERIMENTAL DESIGN,
by J. J. Hargreaves, W. G. Robertson, Frode Ulvedal, H. J. Zeft, and B. E. Welch. 1966, 8p SAM-TR-66-256
Proj. AF-7930
Task 793002
See also AD-641 819.
Availability: Published in Aerospace Medicine v37 n6 p552-5 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Helium, Toxicity), (*Oxygen, Toxicity), Space medicine, Respiration, Tolerances (Physiology), Space simulation chambers, Experimental design, Gas analysis.

Four Air Force aircrew members ranging in age from 27-29 years lived in the USAF-SAM double-wall test cell for 68 consecutive days. The test cell, with a total volume of 40.2 cubic meters, was operated at ground level for 8 days, at 257.7 mm. Hg for 56 days and at ground level for 4 days. During the 56 days at 257.7 mm. Hg total pressure, the atmosphere consisted of 175.2 mm. Hg PO2 and 73.9 mm. Hg PHe. PN2 averaged 1.9 mm. Hg. The purpose of the experiment was to evaluate the physiologic suitability of this atmosphere for use in future manned space missions. This suitability was established by detailed, repetitive examination of physiologic functions throughout the course of the experiment. (Author)

AD-641 827 **Field 6S**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 mm. Hg TOTAL PRESSURE. III. HEAT EXCHANGE,
by W. L. Epperson. 1966, 10p SAM-TR-66-233
Proj. AF-7930
Task 793002
See also AD-641 828.
Availability: Published in Aerospace Medicine v37 n5 p457-62 May 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Helium, Toxicity), (*Oxygen, Toxicity), (*Space medicine, *Respiration), Body temperature, Body weight, Metabolism, Heat production (Biology), Exercise.

Four male subjects were exposed to an atmosphere of helium (205.5 mm. Hg) and oxygen (165.4 mm. Hg) at a pressure of 379.9 mm. Hg for a period of two weeks and to an atmosphere of 579.3 mm. Hg helium and 159 mm. Hg. oxygen at 760 mm. Hg for one day. Body temperatures, environmental temperatures, body weights and metabolic heat were determined both at rest and at exercise. From these data the thermal balance of each subject was calculated. Differences in both skin temperatures and heat balance were seen between the experimental environments and ground level air. In particular, heat loss by convection was increased and heat loss by evaporation was reduced in the 579.3 mm. Hg helium condition. A theoretical consideration of convective heat exchange is presented. (Author)

AD-641 828 **Field 6S**
Not available from CFSTI.
School of Aerospace Medicine, Brooks AFB, Tex.
OBSERVATIONS ON MAN IN AN OXYGEN-HELIUM ENVIRONMENT AT 380 mm. Hg TOTAL PRESSURE. II. RESPIRATORY,
by W. G. Robertson, H. J. Zeft, V. S. Behar, and B. E. Welch. May 66, 8p SAM-TR-66-231
AF-7930
Task 793002
See also AD-641 827.
Availability: Published in Aerospace Medicine v37 n5 p453-6 May 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Helium, Toxicity), (*Oxygen, Toxicity), (*Space medicine, *Respiration), Oxygen consumption, Respiratory system, Carbon dioxide, Lungs, Volume, Space simulation chambers, Tolerances (Physiology).

The pulmonary effects of a 2-week exposure to a helium-oxygen atmosphere at a total pressure of 380 mm. Hg were evaluated in four healthy young men. Oxygen consumption, carbon dioxide production, alveolar ventilation, dead space, and alveolar gas tensions were determined. The various lung compartments including residual volumes were measured. In addition, vital capacities

and maximum breathing capacities were studied. Carbon monoxide diffusing capacities were measured just prior to exposure to the oxygen-helium atmosphere and immediately upon descent from altitude. All other studies were carried out during a 14-day pre-experimental control period, 15-day experimental exposure, and a 6-day post-experimental period. Results are discussed with reference to the physical characteristics of helium. An analysis of the effects of the decreased density of the inspired gas mixture is presented. (Author)

AD-641 829 **Field 6S**

Not available from CFSTI.

School of Aerospace Medicine, Brooks AFB, Tex.

THE STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm Hg TOTAL PRESSURE. VII. RESPIRATORY FUNCTION,

by William G. Robertson, and Gerald L. McRae. 1966, 9p SAM-TR-66-257
Proj. AF-7930
Task 793002
See also AD-641 805, AD-641 830.
Availability: Published in Aerospace Medicine v37 n6 p578-82 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Respiration, *Space medicine), Lungs, Metabolism, Oxygen consumption, Carbon dioxide, Volume, Tolerances (Physiology), Space simulation chambers.

The respiratory effects of a 56-day exposure to an oxygen partial pressure of 175.2 mm Hg with a helium partial pressure of 73.9 mm Hg at a total pressure of 257.7 mm Hg were evaluated in four healthy U. S. Air Force crew members. Control data was obtained during an 8-day pre-experimental and a 4-day post-experimental period. Steady-state carbon monoxide diffusing capacities were unchanged pre- and post- experimentally. Basal oxygen consumption and carbon dioxide production were increased throughout the experimental period. This increase is attributed to an increased water loss at altitude. Vital capacities were decreased approximately 4% with ascent to altitude but returned toward pre-experimental values with time. Vital capacities were all normal immediately on descent from altitude. Lung compartment measurements reflected the decrease in vital capacity at altitude as an apparent decrease in total lung volume as a function of a decreased expiratory reserve volume. Residual volumes were unchanged. Maximum breathing capacities increased approximately 40% as a function of the decreased atmospheric density. There were no changes that would indicate that this atmosphere produces any impairment of man's pulmonary function. (Author)

AD-641 830 **Field 6S**

Not available from CFSTI.

School of Aerospace Medicine, Brooks AFB, Tex.

THE STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg TOTAL PRESSURE: VIII. OBSERVATIONS ON FEEDING BITE-SIZE FOODS,

by Norman D. Heidelbaugh, John E. Vanderveen, Mary V. Klicka, and May J. O'Hara. 1966, 12p SAM-TR-66-242
Proj. AF-7758
Task 775803
See also AD-641 829, AD-641 804.
Availability: Published in Aerospace Medicine v37 n6 p583-90 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Oxygen, Toxicity), (*Helium, Toxicity), (*Diet, *Space medicine), Nutrition, Space simulation chambers, Ingestion (Physiology), Acceptability, Food.

Twenty-one bite-sized foods supplemented with eight fruit juices, an enriched drink, coffee, tea, sugar, a vitamin-mineral tablet and water ad libitum were arranged into a 2-day menu cycle. This feeding system was offered to 4 flight crew members as the sole source of nutrients for a period of 72 days, including 56 consecutive days in a space vehicle simulator containing an atmosphere of 257.7 mm. Hg total pressure including 175.2 mm. HgPO2 and 73.9 mm. HgPHe. The relationship between the consumption of food and the following was studied: initial and mean acceptability ratings by the subjects, ratings by a technical taste panel, rehydratability, and fat content of the food. Trends in each subject's consumption and acceptability rating of each food item were studied as a function of time. The manufacturing procedures and criteria for each food are outlined. Suggestions are offered for adapting this type of feeding system for use in aerospace situations. (Author)

AD-641 953 **Field 6S**

Not available from CFSTI.

School of Aerospace Medicine, Brooks AFB, Tex.

THE STUDY OF MAN DURING A 56-DAY EXPOSURE TO AN OXYGEN-HELIUM ATMOSPHERE AT 258 mm. Hg. TOTAL PRESSURE. XII. CLINICAL OBSERVATIONS,

by Howard J. Zeft, Lester J. Krasnogor, George J. Motsay, Hayden v. Glatte, and William G. Robertson. Jun 66, 8p SAM-TR-66-255
Proj. AF-7930
Task 793002
See also AD-641 816.
Availability: Published in Aerospace Medicine v37 n6 p601-4 Jun 1966.

Descriptors: (*Pressure breathing, Helium), (*Spacecraft cabins, Atmosphere), (*Helium, Toxicity), (*Oxygen, Toxicity), Space medicine, Medical examination, Space simulation chambers, Electrocardiography, Electroencephalography, Blood chemistry, Hematology, X rays, Exercise, Pathology, Stress (Physiology).

The report describes the clinical findings in four aircrew members who lived for 56 days in an oxygen-helium environment at 258mm. Hg total pressure. During pre- and post-experimental periods, the subjects underwent a complete medical evaluation to include appropriate roentgenographic studies, electrocardiograms, electroencephalograms, and blood chemistires. During the 56-day test phase, clinical symptoms were minimal. Most bothersome to the subjects were increased amounts of flatus, only rarely causing abdominal discomfort from trapped intestinal gas. All of the individuals developed mucous membrane dryness associated with a decreased relative humidity in the chamber. Two subject noted nasal congestion and none experienced middle ear problems. One individual developed mild elevations in transaminase enzymes which could not be explained. Resting electrocardiograms from another subject showed intermittant changes consistent with the Wolf-Parkinson-White syndrome, which could not be attributed to the environment. Daily exercise was performed on a bicycle ergometer without symptoms or signs of a decompression disturbance. At no time during the experiment were there any clinical distrubances which might have prevented the completion of a prolonged manned space mission. (Author)

N66-33446 **Field 6S**

CFSTI Prices HC$1.00 MF$1.25

National Aeronautics And Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY - A CONTINUING BIBLIOGRAPHY WITH INDEXES, JUNE 1966.

Jul 66, 196p NASA-SP-7011/26/

Descriptors: *Aerospace medicine, *Bibliography, *Biology, Abstract, Annotation, Biological, Effect, Flight, Physiology, Planetary, Psychology, Safety, Sanitation, Simulation, Space.

For abstract, see STAR 04 19.

N66-33725 **Field 6S**

CFSTI Prices HC$1.00 MF$0.50

National Aeronautics And Space Administration, Washington, D. C.

AN IMPORTANT STEP IN SPACE MEDICINE. SOME RESULTS OF THE EXPERIMENT ON THE COSMOS 110 SATELLITE.

Vazhnyy Etap Kosmicheskoy Meditsiny. Nekotoryye Itogi Eksperimenta Na Sputnike "kosmos-110"

by N. N. Gurovskiy, A. A. Kiselev, V. N. Pravetskiy, and B. B. Yegorov. Aug 66, 6p NASA-TT-F-10243
Transl. Into English From Turkm. Iskra (Ussr), 19 May 1966 P 4

Descriptors: *Aerospace medicine, *Cosmos satellite, *Physiology, *Weightlessness, Aerospace, Blood, Calcium, Cardiovascular, Excretion, Factor, Gastrointestinal, Human, Medicine, Motor, Nervous, Program, Salt, Satellite, Space, System, U.s.s.r., Urine.

For abstract, see STAR 04 19.

N66-38718 **Field 6S**

CFSTI Prices HC$1.00 MF$0.50

West Virginia Univ., Morgantown.

THE EFFECT OF CHANGING GRAVITY AND WEIGHTLESSNESS ON VASOPRESSIN CONTROL SYSTEMS PROGRESS REPORT, FEB. 15 - SEP. 20, 1966.

by W. H. Moran Jr. 1966, 15p NASA-CR-78494
Contract NGR-49-001-019

Descriptors: *Animal study, *Blood, *Circulatory system, *Diuretics, *Hormone, Animal, Antidiuretic, Chelate, Circulatory, Destruction, Freezing, Mechanism, Ph factor, Preservation, Sample, Study, System, Temperature.

For abstract, see STAR 04 23.

N66-38729 **Field 6S**

CFSTI Prices HC$1.00 MF$0.50

Naval School Of Aviation Medicine, Pensacola, Fla.

THE ELECTROENCEPHALOGRAM OF THE SQUIRREL MONKEY (SAIMIRI SCIUREUS) IN A VERY HIGH MAGNETIC FIELD.

by D. E. Beischer, and J. C. Knepton Jr. Jun 66, 21p NASA-CR-78539, NAMI-972
NASA ORDER R-39
Joint Rept. With Nasa

Descriptors: *Electroencephalogram (eeg), *Magnetic field, *Monkey, Animal, Eeg, Effect, Field, Laboratory, Magnetic, Nervous, Squirrel, Study, System.

For abstract, see STAR 04 23.

N66-33138 **See Field 5E**

6T. TOXICOLOGY

N66-32963 **Field 6T**

CFSTI Prices HC$2.00 MF$0.50

Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.

AN ASSEMBLY CONTAMINATION MODEL.

by E. J. Sherry, and C. A. Trauth Jr. Jul 66, 36p NASA-CR-76999, SC-RR-66-421
NASA ORDER R-09-019-040

Descriptors: *Mathematical model, *Random variable, *Spacecraft contamination, Assembly, Biological, Contamination, External, Internal, Mathematics, Model, Process, Random, Spacecraft, Sterilization, Stochastic, Stochastic process, Structure, Variable.

For abstract, see STAR 04 19.

AD-641 572 See Field 6A

AD-641 794 See Field 6E

AD-641 826 See Field 6A

PB-173 462 See Field 6O

PB-173 466 See Field 6O

PB-173 467 See Field 6O

7A. CHEMICAL ENGINEERING

N66-33499 Field 7A
CFSTI Prices HC$3.75 MF$1.50
Polytechnic Inst. Of Brooklyn, N. Y. Dept. Of Chemical Engineering.
THERMALLY REGENERABLE CARBON DIOXIDE ABSORBENT SYSTEM FINAL REPORT, 1 MAY 1964 - 31 JAN. 1966.
by H. P. Gregor, I. F. Miller, and O. W. Weber.
Apr 66, 252p NASA-CR-65450
Contract NAS9-2792

Descriptors: *Absorption, *Carbon dioxide, *Ion exchange resin, *Solid state, Carbon, Dioxide, Equilibrium, Exchange, Gas, Humidity, Ion, Polyethylene, Pressure, Regeneration, Resin, Solid, State, Temperature, Thermal.

For abstract, see STAR 04 19.

N66-38086 Field 7A
CFSTI Prices HC$4.00 MF$1.00
Electro-optical Systems, Inc., Pasadena, Calif.
PULSED GAS CHROMATOGRAPHIC SEPARATION FINAL REPORT.
by L. Ferder, E. Findl, and K. Lui. 21 Aug 66, 115p NASA-CR-73031, EOS-6997-FINAL
Contract NAS2-3209

Descriptors: *Adsorption, *Binary mixture, *Desorption, *Gas chromatography, Column, Cycling, Length, Life, Mode, Moisture, Pressure, Pulse, Removal, Separation, Test, Volume.

For abstract, see STAR 04 23.

7B. INORGANIC CHEMISTRY

AD-641 345 Field 7B, 7C
CFSTI Prices: HC$1.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
CATALYTIC REACTIONS OF HYDRAZINE,
by Lester P. Kuhn. Aug 50, 13p BRL-735
Proj. TB3-0110

Descriptors: (*Hydrazine, *Catalysis), Nitrocellulose, Nitrates, Nitrites, Reduction (Chemistry), Catalysis, Absorption (Physical), Decomposition.

Nitrate and nitrite esters and nitro compounds are rapidly and quantitatively reduced by hydrazine in the presence of a platinum or palladium catalyst. Carbon-carbon and carbon-oxygen double bonds are not reduced. In the absence of the oxidizing agent hydrazine is absorbed but not decomposed by the catalyst. In the presence of a Raney nickel catalyst, but in the absence of an oxidizing agent, hydrazine is decomposed to hydrogen, nitrogen, and small amounts of ammonia. (Author)

AD-641 578 Field 7B, 7C
CFSTI Prices: HC$2.00 MF$0.50
Space-General Corp., Los Angeles, Calif. Center for Research and Education.
ANALYSIS OF BORANES AND CARBORANES BY MASS SPECTROMETRY.
Technical rept.,
by J. F. Ditter, F. James Gerhart, and Robert E. Williams. 12 Oct 66, 33p TR-10, SGC-482-10
Contract Nonr-4381 (00)
Proj. NR-356-461

Descriptors: (*Boranes, *Mass spectroscopy), (*Organoboranes, Mass spectroscopy), Mass spectrum, Decomposition, Chemical analysis, Molecular structure, Isotopes.

Identifiers: Carboranes.

Boranes and carboranes each have their own characteristic mass spectral patterns which serve as means for quick identification and analysis. The so-called 'stable' boranes fragment rather severely under electron impact, the 'unstable' boranes even moreso. Both types have broad, rounded spectral profiles. Closocarboranes which are a very stable class of compounds, on the other hand, are very resistant to fragmentation, and consequently display sharp cut-offs at their high mass numbers. Alkylated derivatives of both boranes and carboranes have the same general fragmentation patterns as do their nonalkylated parents. A useful mass spectrometric technique applicable to these compounds to determine the number of boron and carbon atoms involves careful measurement of the 13C- containing ion that appears above the normal cut-off peak. The method is illustrated with C4B6H12, the dimethyl derivative of the carborane, C2B6H8. (Author)

AD-641 605 Field 7B, 7C
CFSTI Prices: HC$1.00 MF$0.50
University of South Florida, Tampa.
A STUDY OF ORGANOMETALLIC-CHELATE COMPOUNDS.
Final rept., 1 Sep 64-30 Jun 66,
by Dean F. Martin. 30 Jun 66, 11p
Grant DA-ARO (D)-31-124-G588
Proj. DA-20014501-B13B
AROD-5200:6

Descriptors: (*Metalorganic compounds, *Chelate compounds), Complex compounds, Chemical equilibrium, Thermochemistry, Synthesis (Chemistry), Reaction kinetics, Stereochemistry, Chemical bonds.

A summary is given of work involving the coordination chemistry of chelate compounds which have had organometallic ions substituted for the central metal ion. Topics include: equilibria of complex formation; studies of reaction mechanisms; studies of stereochemistry and chemical bonding.

N66-33719 Field 7B
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
DIFFUSION OF URANIUM IN MOLYBDENUM, NIOBIUM, ZIRCONIUM, AND TITANIUM.
Diffuziya Urana V Molibdene, Niobii, Tsirkonii I Titane
by V. N. Bykov, A. I. Nakonechnikov, and L. V. Pavlinov. Jun 66, 12p NASA-TT-F-10222
Transl. Into English From Atomnaya Energ. (Moscow), V. 19, 1965 P 521-523

Descriptors: *Diffusion, *Molybdenum, *Niobium, *Titanium, *Uranium, *Zirconium, Activation, Coefficient, Defect, Dependence, Energy, Metal, Metallurgy, Radioactivity, Temperature, Tracer, Vacancy.

For abstract, see STAR 04 19.

N66-33721 Field 7B
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
THE VAPOR COMPOSITION IN THE HALIDE SYSTEMS OF CERTAIN ALKALI AND ALKALI EARTH METALS.
O Sostave Para V Sistemakh Galogenidov Nekotorykh Shchelochnykh I Shchelochnozemel' Nykh Metallov
by A. L. Kuzimenko, and G. I. Novikov. Jun 66, 17p NASA-TT-F-10195
Transl. Into English From Vestn. Leningr. Univ., Ser. Fiz. I Khim. (Leningrad), No. 16, 1964 P 143-149

Descriptors: *Alkali halide, *Rare 'earth, *Vapor phase, Alkali, Binary, Chloride, Composition, Compound, Dissociation, Earth, Equilibrium, Halide, Metal, Phase, Potassium, Rare, Rate, Thermodynamics, Vapor.

For abstract, see STAR 04 19.

N66-33769 Field 7B
CFSTI Prices HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
SURFACE ADSORPTION IN MAGNESIUM OXIDE.
by M. H. Leipold, and T. H. Nielsen. 1 Jun 66, 23p NASA-CR-77117, JPL-TR-32-949
Contract NAS7-100

Descriptors: *Adsorption, *Argon, *Helium, *Hydroxyl, *Magnesium oxide, Binding, Decomposition, Energy, Gas, Impurity, Ion, Magnesium, Oxide, Reaction, Surface.

For abstract, see STAR 04 19.

AD-641 363 See Field 20L

AD-641 544 See Field 7D

AD-641 697 See Field 19A

NBS-Misc-Pub-260-14 See Field 11F

NBS-NSRDS-7 See Field 7D

7C. ORGANIC CHEMISTRY

AD-156 422 Field 7C
CFSTI Price: HC$1.60
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
INVESTIGATION OF METHODS FOR THE ANALYSIS OF LEAD AZIDE,
by Roscoe Croom, and Frank Pristera. Mar 58, 11p TR-2486

Descriptors: (*Azides, *Lead compounds), Analysis, Test methods.

Doubts have been expressed recently concerning the validity of the values obtained from the assay of lead azide by the gasometric method of analysis. These doubts led ultimately to a review of the three methods outlined in this report to ascertain which is the most acceptable for inclusion in the specification as the standard procedure of analysis. The methods reviewed were the gasometric method, the British (ERDE) method, and the distillation-titration method developed by the Naval Ordnance Laboratory (NOL).

AD-449 505 Field 7C, 7E, 15G
CFSTI Price: HC$3.00
American Cyanamid Co., Bound Brook, N. J.
STUDY OF CHROMOTROPIC PROPERTIES OF COLORANTS.
Textile series rept.,
by Ralph A. Coleman, Walter H. Foster, Jr., Haig C. Donian, and Marion Mason. Feb 64, 80p
Contract DA-19-129-AMC-19 (X)
Proj. DA-1K024401A113
C/OM-TS-129

Descriptors: (*Camouflage, Photochemistry), (*Dyes, Photochemistry), (*Colors, Chemical reactions), Photochromism, Theory, Reaction

kinetics, Mathematical analysis, Solar radiation, Intensity, Heterocyclic compounds, Organic nitrogen compounds, Polycyclic compounds, Organic sulfur compounds, Metalorganic compounds, Complex compounds, Spiro compounds, Cellulose acetates, Organic oxygen compounds, Feasibility studies.

In order to explore technical feasibility regarding the use of chromotropic colorants for a 'chameleon' type camouflage system, photochromic, thermochromic, and chemochromic systems have been studied. Where possible, simple theoretical models for the various systems were analyzed mathematically to establish the thermodynamic and kinetic quantities which a suitable system must possess. Known compounds, representative of the three chromtoropic classifications, were examined experimentally in both solution and polymer media. Consideration of the theoretical presently offer the most feasible approach for a chromotropic camouflage system. Of the presently available photochromic systems which were examined, the system based upon dithizonate and its metal complexes--particularly Hg (II)--showed the most promising results. The dithizonate system should provide a useful model system for future synthetic and physical chemical work in this area. (Author)

A -449 913 **Field 7C**
CFSTI Price: HC$1.60
Royal Aircraft Establishment, Farnborough (England).
FLUOROAROMATIC POLYMERS. PERFLUORO-P-TERPHENYL, -QUATERPHENYL AND -QUINQUEPHENYL,
by J. Thrower, and M. A. White. May 64, 19p
Technical note, TN-CPM-74

Descriptors: (*Halogenated hydrocarbons, Polymers), (*Fluorine compounds, Aromatic compounds), (*Polymers, Fluorine compounds), Grignard reactions, Grignard reagents, Diphenyl, Synthesis (Chemistry), Chemical reactions, Absorption spectrum, Spectra (Visible and ultraviolet), Spectra (Infrared), Physical properties, Halocarbon plastics, Great Britain.

Reaction of perfluorobiphenyl with pentafluorophenylmagnesium bromide (2:1 molar ratio) in tetrahydrofuran has given perfluoro-p-terphenyl, perfluoro-p-quaterphenyl and perfluoro-p-quinquephenyl. These structures have been confirmed by Ullmann syntheses and some of their properties are described. The significance of their formation during the Grignard reaction is discussed in relation to the structures of fluoropolyphenylenes prepared earlier. (Author)

AD-641 303 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
Fordham Univ., Bronx, N. Y. Dept. of Chemistry.
SMALL RING COMPOUNDS.
Final rept. 1 Oct 61-30 Sep 65,
by Emil J. Moriconi. 30 Oct 65, 22p
Grants AF-AFOSR-62-18, AF-AFOSR-488-64
Proj. AF-9762
Task 976202
AFOSR-66-2452

Descriptors: (*N-heterocyclic compounds, Synthesis (Chemistry)), Ketones, Hydroxamic acids, Indoles, Polycyclic compounds, Cycloalkanes, Organic nitrogen compounds.

Identifiers: Amidines, Aza bicyclooctanes, Indones, Lactams, Oxindolylenes, Quinoxalines.

A summary is given of research, the ultimate objective of which was the synthesis of small ring compounds fused to an aromatic frame, such that the aza-atom was either exocyclic or endocyclic to the small ring. Topics include: Ring expansion of 1-indanones to cyclic hydroxamic acids; Oxindolylene chemistry; Reactions of 2, 3-disubstituted quinoxalines; Origin of the carbonyl doublet in 2-indanone and trans-hexahydro-2-indanone; Syntheses of cis- and trans-7-azabicyclo (4.2.0)octanes; Preparation of beta-lactams containing an exocyclic double bond; Synthesis and reactions of cyclic amidines.

AD-641 414 **Field 7C**
CFSTI Prices: HC$3.00 MF$0.75
Stauffer Chemical Co., Adrian, Mich. Silicone Div.
RESEARCH ON SYNTHESIS AND CHARACTERIZATION OF HIGHLY ARYLATED ORGANOSILICON COMPOUNDS.
Final rept.,
by G. M. Hart, B. D. Karstedt, C. W. Newing, K. C. Pande, and K. S. Shim. Jul 66, 62p
Contract AF 33 (616)-8355
Proj. AF-7023
ARL-66-0139

Descriptors: (*Aromatic compounds, Silanes), (*Silanes, Synthesis (Chemistry)), Metalorganic compounds, Lithium compounds, Grignard reagents, Halogen compounds, Bromine compounds, Fluorine compounds, Organic sulfur compounds.

Identifiers: Phenyl silanes.

A series of fifteen organosilicon monomers was prepared via the reaction of organolithium reagents and Grignard reagents with tetrahalosilanes and organohalosilanes. In general, the compounds are aryl or bromoaryl monosubstituted derivatives of various diorganodihalosilane and triorganohalosilane intermediates. A significant exception to this generalization is the series of compounds containing the 2,2'-biphenylenesilyl moiety which was prepared via a cyclization reaction between 2,2'-dilithiobiphenyl and an appropriate polyhalosilane. Steric hindrance, a difficulty encountered in synthesizing several of the desired intermediates, was circumvented by the use of the reaction between Grignard reagents and fluorosilanes. (Author)

AD-641 462 **Field 7C**
Not available from CFSTI.
Mellon Inst., Pittsburgh, Pa.
THE PROTON MAGNETIC RESONANCE SPECTRA OF OLEFINS. V. 3-CHLORO- AND 3-METHOXYPROPENES.
Interim rept.,
by Aksel A. Bothner-By, S. Castellano, S. J. Ebersole, and H. Gunther. 27 Jan 66, 6p
Grant AF-AFOSR-199-63
Proj. AF-9710
Task 971003
AFOSR-66-1749
Availability: Published in Journal of the American Chemical Society v88 p2466-8 1966.

Descriptors: (*Alkenes, *Nuclear magnetic resonance), (*Propenes, Nuclear magnetic resonance), Halogenated hydrocarbons, Ethers, Chlorine compounds, Acroleins, Acetals, Molecular isomerism, Heat of reaction, Stereochemistry.

Identifiers: Acrolein dimethyl acetals, Allyl chlorides, Allylene dichlorides, Allyl methyl ethers.

The high-resolution proton magnetic resonance spectra of allyl chloride, allylidene chloride, allyl methyl ether, and acrolein dimethyl acetal were each obtained at three or four temperatures in the range -50 to +130C, and were analyzed in terms of chemical shifts and (H,H) coupling constants. The magnitude and temperature dependence of the coupling constants indicate which rotamer is the more stable in each case, and an approximate thermodynamic treatment yields limits for the heat of reaction. The values deduced were: allyl chloride, 100 plus or minus 30 cal/mole (H-eclipsed favored); allylidene chloride, 800 plus or minus 100 cal/mole (H-eclipsed favored); allyl methyl ether, -115 plus or minus 30 cal/mole (O-eclipsed favored); acrolein dimethyl acetal, -110 plus or minus 30 cal/mole (O-eclipsed favored). (Author)

AD-641 575 **Field 7C, 7D**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Santa Barbara. Dept. of Chemistry.
EFFECTS OF HIGH PRESSURES ON THE ABSORPTION SPECTRUM OF AZOBENZENE.
Technical rept.,
by A. H. Kadhim, and H. W. Offen. 18 Oct 66, 22p TR-1
Contract N00014-66-C0019-A01
Proj. NR-056-479
Prepared for publication in the Journal of the American Chemical Society.

Descriptors: (*Organic nitrogen compounds, Spectra (Visible +ultraviolet)), (*Electron transitions, High-pressure research), Benzenes, Absorption spectrum, Polymers, Molecular orbitals, Compressive properties, Selection rules, Band spectrum.

Identifiers: Azobenzenes.

The effects of high pressures (0-25 kbar) on the near ultraviolet and visible absorption spectra of trans-azobenzene were studied. Azobenzene was dispersed in six different polymer matrices and compressed in an optical cell at room temperature. The magnitude and direction of the spectral shift depend upon the type of transition (n-pi* vs. pi-pi*), the nature of the polymer matrix, and other specific interactions whose relative importance are not easily ascertained. The n-pi* band showed a blue shift in a hydroxylic polymer at the highest pressure. The intensity of the pi-pi* band was unaffected by compression while the n-pi* band strength increased significantly. Such enhancement could result from partial removal of its symmetry-forbiddenness or greater intensity stealing from the pi-pi* transition at higher pressures. (Author)

AD-641 609 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
Ohio State Univ. Research Foundation, Columbus.
SYNTHESIS AND PROPERTIES OF NAPHTHO- AND PHENANTHRAQUINONES.
Final rept., 1 Jul 63-31 Aug 66,
by M. S. Newman. 31 Aug 66, 7p Rept. no. 1667-4
Grant DA-ARO (D)-31-124-G473
Projs. DA-20010501B700
AROD-4237:3

Descriptors: (*Polycyclic compounds, *Quinones), Chemical reactions, Synthesis (Chemistry), Naphthalenes, Phenanthrenes, Chemical properties.

Identifiers: Naphthoquinones, Phenanthrene quinones.

A research program on the synthesis and properties of quinones and a study of bicyclic mechanisms is summarized. (Author)

AD-641 731 **Field 7C**
Not available from CFSTI.
Pittsburgh Univ., Pa. Dept. of Chemistry.
PHOSPHONIC ACIDS AND ESTERS. XV. PREPARATION AND PROTON MAGNETIC RESONANCE SPECTRA OF THE DIETHYL ALPHA- AND BETA-CHLOROVINYLPHOSPHONATES,
by W. M. Daniewski, M. Gordon, and C. E. Griffin. 17 Feb 66, 7p
Grant AF-AFOSR-470-64
Proj. AF-9762
Task 976201
AFOSR-66-1829
See also AD-629 803.
Availability: Published in Journal of Organic Chemistry v31 p2083-7 Jul 1966.

Descriptors: (*Phosphonic acids, Chemical properties), Nuclear magnetic resonance,

Chlorine compounds, Alkenes, Oxidation, Molecular isomerism, Molecular structure, Stereochemistry, Photolysis, Synthesis (Chemistry).

Identifiers: Diethyl chlorovinyl phosphonates.

The oxidative chlorophosphonation of vinyl chloride was shown to lead to the formation of dichloroethylphosphonic dichlorides which can be converted by esterification to a mixture of diethyl beta,beta-dichloroethylphosphonate (I) and diethyl alpha,beta-dichloroethylphosphonate (II). The former ester is the major component of the reaction mixture. In contrast to the results of Soborovskii, it was found that treatment of the mixture of esters with triethylamine leads to rapid dehydrochlorination of II with the formation of diethyl alpha-chlorovinylphosphonate; I undergoes a relatively slow dehydrochlorination to yield isomeric trans-beta-chlorovinylphosphonate (III). The trans ester can also be formed by photolysis of trans-1-chloro-2-iodoethylene in the presence of triethylphosphite; a small amount of cis-III is also isolated in this reaction. The structures and stereochemistry of the vinylphosphonates III were established by proton magnetic resonance spectroscopy. Each of these compounds yielded a first-order ABX spectrum and unequivocal assignments of P31-H1 and H1-H1 coupling constants (gem, cis, and trans) were made. (Author)

AD-641 740 **Field 7C**
Not available from CFSTI.
Fordham Univ., Bronx, N. Y. Dept. of Chemistry.
NUCLEAR MAGNETIC RESONANCE STUDY OF 2,3-QUINOXALINE DICARBOXALDEHYDE AND ITS CYCLIC MONOHYDRATE,
by Emil J. Moriconi, James W. Young, Thomas E. Brady, and Albert J. Fritsch. 5 Nov 65, 8p
Grants AF-AFOSR-62-18, AF-AFOSR-488-64
Proj. AF-9762
Task 976202
AFOSR-66-1852
Availability: Published in Canadian Journal of Chemistry v44 p1596-9 1966.

Descriptors: (*N-heterocyclic compounds, *Nuclear magnetic resonance), (*O-heterocyclic compounds, Nuclear magnetic resonance), Aldehydes, Hydrates, Molecular structure, Chemical reactions, Molecular isomerism.

Identifiers: Quinoxaline dicarboxyaldehyde, Rearrangement reactions.

The structure and interconversion in the presence of water of 2,3-quinoxaline dicarboxaodehyde and its cyclic monohydrate were determined by nuclear magnetic resonance.

AD-641 797 **Field 7C, 11I**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles. Dept. of Chemistry.
MODELS FOR ASYMMETRIC INDUCTION IN POLYMERIZATION.
Final rept. 1 Oct 64-30 Sep 66,
by Donald J. Cram. 15 Oct 66, 7p
Grant AF-AFOSR-124-65
Proj. AF-9762
Task 976202
AFOSR-66-2571

Descriptors: (*Polymerization, Catalysis), Stereochemistry, Models (Simulations), Molecular structure, Molecular association, Substitution reactions.

Both synthetic and natural synthetic polymers, for example stereo-regular polypropylene and cellulose, contain many asymmetric centers whose configurational relationships are fixed rather than random. The work summarized in this paper, models for 1,3- and 1,5-asymmetric induction were developed. These models, based on simple reactions, demonstrate the general validity of a rational steric approach to the mechanism of ordered elaboration of asymmetric centers in synthetic and natural polymers. (Author)

AD-641 873 **Field 7C, 11I**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Lab., White Oak, Md. Non-Metallic Materials Div.
THE SYNTHESIS AND CHARACTERIZATION OF SPIRO POLYMERS,
by Angelo A. Volpe, and William J. Bailey. 9 Sep 66, 35p
Proj. FR-71
NOLTR-66-120

Descriptors: (*Spiro compounds, *Polymers), Polymerization, Condensation reactions, Ketones, Thermogravimetric analysis, Decomposition, Thermal stability, Molecular structure, Crosslinking (Chemistry), Synthesis (Chemistry), Copolymerization, Solubility, Heat-resistant plastics.

Identifiers: Polyspiroketals.

The synthesis of the first completely organic spiro polymers is reported. This was accomplished by the acid-catalyzed condensation of pentaerythritol with 1,4-cyclohexanedione and with 1,10-cyclooctadecanedione. The temperature at which 50% decomposition occurs of these polymers was determined by thermo-gravimetric analysis and was found to be in the 400-450C range, which was higher than expected for nonaromatic, oxygen-containing polymers. The proof of structure of these spiro polymers, in which they were shown to be linear polyspiroketals rather than randomly crosslinked polymers, was accomplished by infrared analysis, elemental analysis, X-ray crystallography, intrinsic viscosity measurements, and solubility studies. Several other spiro polymers of lower molecular weight were synthesized and a correlation between molecular weight and thermal stability, as well as solubility, was observed. Finally, a copolymer of pentaerythritol, 1,4-cyclohexanedione and 1,10-cyclooctadecanedione was synthesized and its thermal properties, solubility characteristics, and molecular structure were studied. (Author)

AD-641 975 **Field 7C**
CFSTI Prices: HC$3.00 MF$0.75
Maryland Univ., College Park. Dept. of Chemistry.
CHEMICAL RESEARCH ON POLYPHENYLS.
Annual technical rept.,
by G. Forrest Woods. Jul 66, 58p
Contract AF 33(615)-2710
Proj. AF-7023
ARL-66-0144
See also AD-615 900.

Descriptors: (*Polycyclic compounds, Synthesis (Chemistry)), Grignard reagents, Benzenes, Cyclohexenes, Dienes, Chemical bonds, Alkynes, Glycols, Vapors, Ketones, Elimination reactions, Bromine compounds.

Identifiers: Cyclohexenyl cyclohexadienyl benzenes, Polyphenylenes.

An investigation is reported aimed at the synthesis of ring polyphenyls (polyphenylenes). One is a ring of five phenylene groups, and the other is the all-meta-six phenylene compound. Related to this work was a study of selective Grignard reagent preparation from substances containing two or three bromine atoms. The preparation of 1-(1-cyclohexenyl)-4-(1,3-cyclohexadienyl)benzene almost been completed. The intent is to learn whether unsaturation may go across a benzene nucleus, such that in the above substance 4-cyclohexylbiphenyl will result. Reported also is (1) the work on the utilization of the reaction of calcium carbide with ketones whereby acetylenic glycols are obtained. These glycols can then be converted to substituted 1,3,5-hexatrienes and on to p-polyphenyls; (2) the elimination (dehydration) reaction of ketones in the vapor state over alumina. (Author)

N66-33166 **Field 7C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
FORMATION OF CO2 RADICAL IONS WHEN CO2 IS ADSORBED ON IRRADIATED MAGNESIUM OXIDE.
by J. P. Jayne, and J. H. Lunsford. 20 Oct 64, 10p NASA-TM-X-54842
Submitted For Publication

Descriptors: *Adsorption, *Carbon dioxide, *Electron paramagnetic resonance, *Magnesium oxide, *Ultraviolet radiation, Electron, Formation, Ion, Irradiation, Magnesium, Negative, Oxide, Paramagnetic, Radiation, Radical, Resonance, Spectroscopy, Spectrum, Ultraviolet.

For abstract, see STAR 04 19.

N66-33766 **Field 7C**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
ADSORPTION BEHAVIOR OF ORGANIC COMPOUNDS.
Zakonomernosti Adsorbtsii Organicheskikh Soyedineniy
by B. B. Damaskin. Aug 66, 33p NASA-TT-F-10256
Transl. Into English From Usp. Khim. (Ussr), V. 34, No. 10, 1965 P 1764-1779

Descriptors: *Adsorption, *Mercury (metal), *Organic compound, Behavior, Boundary, Capacitance, Compound, Curve, Differential, Electrochemistry, Electrode, Measurement, Organic, Potential, Stress, Surface.

For abstract, see STAR 04 19.

N66-37945 **Field 7C**
CFSTI Prices HC$2.00 MF$0.50
Thiokol Chemical Corp., Elkton, Md.
DEVELOPMENT OF A HYDROCARBON-TYPE OF POLYMER WHICH POSSESSES THE CHARACTERISTICS REQUIRED FOR USE AS A BINDER FOR UNCOATED SPO FIRST QUARTERLY REPORT, MAY 10 - AUG. 10, 1966.
by C. R. Brenn, and C. W. Vriesen. 26 Aug 66, 26p NASA CR-78450, E99-66
Contract NAS7-478

Descriptors: *Copolymer, *Hydrocarbon, *Hydrogenation, *Propellant binder, *Synthesis, Aliphatic, Butadiene, Carbon dioxide, Carboxylic, Compatibility, Compound, Naphthalene, Polymerization, Purification, Stability.

For abstract, see STAR 04 23.

AD-449 913 **See Field 7D**

AD-641 345 **See Field 7B**

AD-641 578 **See Field 7B**

AD-641 605 **See Field 7B**

AD-641 697 **See Field 19A**

AD-641 872 **See Field 11A**

AD-641 986 **See Field 14B**

7D. PHYSICAL CHEMISTRY

AD-445 787 **Field 7D, 10A**
CFSTI Price: HC$3.60
Tyco Labs., Inc., Waltham, Mass.
THE USE OF LARGE ANODIC GALVANOSTATIC TRANSIENTS TO EVALUATE THE MAXI-

MUM ADSORPTION ON PT FROM HCOOH SOLUTIONS.
Technical memo.,
by S. B. Brummer. Aug 64, 40p TM-13
Contract Nonr-3765 (00), ARPA Order-302-62
Rept. on Electrochemistry of Fuel Cells Electrodes.

Descriptors: (*Fuel cells, Electrochemistry), (*Electrodes, Platinum), Carboxylic acids, Perchloric acid, Anodes, Adsorption, Electric currents, Density, Reaction kinetics, Transients, Oxidation, Inhibition.

The adsorption on smooth Pt. from HCOOH solutions in 1N HC104 at 40 C has been studied with anodic and cathodic galvanostatic transients. During the application of a large anodic current, Ia, three processes contribute to the charge passed, Qa. These are: (I) oxidation of adsorbate, (II) oxidation of a species in solution, and (III) surface oxidation of the electrode. By applying a cathodic current, Ic, at various times during the anodic transient, it is possible to measure (III) directly and, from the charge passed in deposition of H-atoms prior to H2 evolution, one can follow changes in the concentration of absorbed HCOOH. By varying In, one can assess the effect of (II). It is found that the contributions of processes (I), (II), and (III) can be effectively separated. (Author)

AD-449 913 **Field 7D, 7C**
CFSTI Price: HC$1.60
Royal Aircraft Establishment, Farnborough (England).
FLUOROAROMATIC POLYMERS. PERFLUORO-P-TERPHENYL, QUATERPHENYL AND QUINQUEPHENYL,
by J. Thrower, and M. A. White. May 64, 19p
Technical note TN-CPM-74

Descriptors: (*Halogenated hydrocarbons, Polymers), (*Fluorine compounds, Aromatic compounds), (*Polymers, Fluorine compounds), Grignard reactions, Grignard reagents, Diphenyl, Synthesis (Chemistry), Chemical reactions, Absorption spectrum, Spectra (Visible + ultraviolet), Spectra (Infrared), Physical properties, Halocarbon plastics, Great Britain.

Reaction of perfluorobiphenyl with pentafluorophenylmagnesium bromide (2:1 molar ratio) in tetrahydrofuran has given perfluoro-p-terphenyl, perfluoro-p-quaterphenyl and perfluoro-p-quinquephenyl. These structures have been confirmed by Ullmann syntheses and some of their properties are described. The significance of their formation during the Grignard reaction is discussed in relation to the structures of fluoropolyphenylenes prepared earlier. (Author)

AD-480 791 **Field 7D, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Princeton Univ., N. J. Gas Dynamics Lab.
KINETIC THEORY OF MOLECULAR RADIOMETRIC FORCE AND RADIOMETER,
by Yau Wu. Jun 66, 32p
Contract AF 49 (638)-1271, Grant NSF-GK-59
Proj. AF-7064
ARL-66-0117

Descriptors: (*Radiometers, Geometric forms), (*Kinetic theory, Superaerodynamics), Molecular structure, Gas flow, Containers, Evapotranspiration, Pressure, Thermal conductivity.

The equation for the molecular radiometric force and moment on a body with convex surface enclosed by an arbitrary closed system in the Knudsen regime has been presented based on the revised theory of thermal transpiration established recently by Wu. Two exact solutions of the molecular vane-radiometers in a cylindrical tube and rectangular duct have been obtained in closed forms and calculated through numerical computation. These solutions reduce to the classical theory developed by Knudsen in the limit of infinitely large containers.

AD-641 308 **Field 7D, 11I, 11J**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
A STUDY OF COHESIVE FORCES, REFRACTIVE INDICES AND GLASS TRANSITION TEMPERATURE DATA OF POLYMERS.
Technical rept.,
by J. H. Sewell. Jun 66, 24p TR-66185

Descriptors: (*Polymers, Physical properties), (*Elastomers, Physical properties), Adhesion, Refractive index, Phase studies, Transition temperature, Chemical bonds, Deformation, Molecular association, Tables, Great Britain.

Identifiers: Cohesion.

There is a linear relationship between the molar refraction, R, and the sum of the molar-attraction constants, (sq. rt. of (EV)), both for liquids and polymers. It follows that cohesive energy density, E/V, is directly proportional to the refractive index function, (n sq. - 1/n sq. + 2) sq. It is shown and found that for two non-polar rubbers, swelling tends to increase as the refractive index of a solvent approaches that of a rubber, but maximum swelling occurs at a lower refractive index than predicted. As expected, swelling data for polar rubbers and solvents do not follow the predicted trend. No relationship is found between glass temperature (TG) and refractive index for polymers having TG's below 298K because of divergences in data from relationships involving cohesive energy density and TG and between R and (sq. rt. of (EV)). (Author)

AD-641 454 **Field 7D, 4A**
Not available from CFSTI.
Mellon Inst., Pittsburgh, Pa.
WEAK TRANSITIONS IN EXCITATION OF N2 BY ELECTRON IMPACT AND COMPARISON WITH EXCITATION BY ABSORPTION OF RADIATION,
by Vincent D. Meyer, and Edwin N. Lassettre.
13 Sep 65, 4p
Grant AF-AFOSR-61-63
Proj. AF-9767
Task 976702
AFOSR-66-1435
Availability: Published in Journal of Chemical Physics v44 n6 p2535-6 Mar 15 1966.

Descriptors: (*Nitrogen, Electron transitions), (*Electron bombardment, Nitrogen), Molecular energy levels, Excitation, Inelastic scattering, Light, Absorption, Band spectrum.

Electron impact spectra of molecular nitrogen (at primary energies of 400V), containing small peaks at excitation energies of 11.86 plus or minus .03V and 12.28 plus or minus .03V, are reported. The most intense singlet-triplet transition in the optical spectrum is not observed, at 11.04V, in electron impact. This observation is shown to be in accord with theory. The probable term symbol for the excited state of the 11.86V transition is discussed. (Author)

AD-641 486 **Field 7D, 12A**
Not available from CFSTI.
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
APPROXIMATIONS TO HARTREE-FOCK PERTURBATION THEORY,
by P. W. Langhoff, M. Karplus, and R. P. Hurst.
23 Aug 65, 12p
Grant AF-AFOSR-191-63
Proj. AF-9767
Task 976701
AFOSR-66-1576
Availability: Published in Journal of Chemical Physics v44 n2 p505-14 Jan 15 1966.

Descriptors: (*Perturbation theory, *Hartree-Fock approximation), Polarization, Electrons.

A detailed examination is made of several approximations to the first-order Hartree-Fock perturbation equation. Four distinct methods are considered: the coupled (Method a) and the uncoupled (Method c) approximation of Dalgarno, a new alternative uncoupled approximation (Method b), and the simplified uncoupled approximation of Karplus and Kolker (Method d). By a comparison of the pertinent equations, it is shown that Methods a, b, and d correspond to each other in the use of a core potential analogous to that appearing in the zeroth-order Hartree-Fock equation, while Method c differs due to the inclusion of an extraneous self-potential term. An alternative analysis based on an orbital basis set expansion of the perturbed function demonstrates that Method c has an energy denominator of the simple Huckel type, while both Methods a and b include important two-electron correction terms. Also, it is found that of the four approximations, only Method c can be obtained as the first-order correction with a zeroth-order many-electron Hamiltonian that has the Hartree-Fock determinant as its eigenfunction; the other techniques are one electron in character, as is the Hartree-Fock method itself. A comparison of the complexity of the various techniques shows that the relative computing times for Methods a, b, c, and d are in the ratio of 300 to 60 to 75 to 1. Thus, Method d is simplest by far, although its speed is achieved by some loss of accuracy with respect to Methods a and b. (Author)

AD-641 544 **Field 7D, 7B**
Not available from CFSTI.
Tufts Univ., Medford, Mass. Dept. of Chemistry.
TEMPERATURE DEPENDENCE OF CHLORINE NQR FREQUENCIES AND Pi BONDING,
by T. E. Haas, and E. P. Marram. 12 Jul 65, 8p
Grant AF-AFOSR-859-65
Proj. AF-9710
Task 971001
AFOSR-66-1740
Availability: Published in The Journal of Chemical Physics v43 n11 p3985-9 Dec 1 1965.

Descriptors: (*Chlorine, *Nuclear magnetic resonance), (*Molecular orbitals, Chlorides), Potassium compounds, Tungsten compounds, Rhenium compounds, Osmium compounds, Iridium compounds, Platinum compounds, Quadrupole moments, Chemical bonds, Crystal lattices, Molecular association.

Identifiers: Nuclear quadrupole resonance.

A theory is presented for the anomalous temperature dependence of chlorine-35 NQR frequencies observed for certain transition-metal-chloride compounds. The basic feature of the theory is a break down of pi bonding due to bending vibrations, and a consequent increase in the electron population in chlorine 2p pi orbitals, causing in turn an increase in the observed NQR frequency. An approximate separation of lattice-motion effects and intramolecular effect is made for the series of compounds K2MC16: M=W, Re, Os, Ir, Pt, and it is shown that the predicted magnitude and behavior of the intramolecular effects agree well with the observed values. (Author)

AD-641 659 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
Cornell Univ., Ithaca, N. Y.
ELECTRON DIFFRACTION STUDIES AT ELEVATED TEMPERATURES.
Annual rept.,
by Simon H. Bauer. Oct 66, 48p
Contract Nonr-401 (14), ARPA Order-23-63
Proj. NR-092-504

Descriptors: (*Electron diffraction analysis, Instrumentation), Operation, Temperature.

When a sample under investigation is illuminated by parallel rays, and suitable lenses are available for the radiation used, the resulting scattering (i.e. diffraction) pattern can be focused onto a plane. Then the spacing of the diffraction maxima and minima is determined by the characteristics of the projection lens and is independent of the location of the sample. An electron diffraction apparatus for gases operating on this principle is not limited by the loss of resolution due to sample spread, nor by the departure of the photographic plate from the focal sphere, as are units of conventional design. An apparatus built on the parallel incidence principle has features which are particulatly advantageous for samples which are available at low densities only, and for studies of surface reflections at grazing incidence. The author reports that during the past year the apparatus under construction since 1963, was brought into operation, and demonstrated that the apparatus operates essentially as predicted.

AD-641 663 **Field 7D, 13H**
CFSTI Prices: HC$3.60 MF$0.50
Naval Air Material Center, PhiladelphiaPa. Aeronautical Materials Lab.
A RADIOCHEMICAL INVESTIGATION OF THE MECHANISM OF FORMATION OF CYANIDE FILMS ON STEEL COMPONENTS IN ALKALI-CYANIDE ELECTROPLATING BATHS.
by Alfred L. Glass. 26 Jun 61, 32p NAMC-AML-1253
Task RRMA-04-011/200-1/R007-10-002

Descriptors: (*Steel, Electroplating), (*Films, Cyanides), Chemisorption.

A radiochemical investigation is reported wherein adsorption isotherms are recorded for the formation of cyanide films on steel surfaces during cadmium plating operations in alkali-cyanide baths. It is shown that a unimolecular layer of cyanide is adsorbed from dilute solutions according to the equation for the Langmuir adsorption isotherm, whereas in more concentrated solutions multilayers of cyanide are adsorbed thru additional van der Waal forces. Additional experimental data are presented establishing that a chemisorption takes place with the formation of a thicker cyanide layer on the cathode when an electrical current is applied. (Author)

AD-641 743 **Field 7D, 8J**
Not available from CFSTI.
Woods Hole Oceanographic Institution, Mass.
TRANSITION ENERGIES FOR A MEROCYANINE DYE IN AQUEOUS ELECTROLYTE SOLUTIONS. SOLVENT POLARITY INDICATOR TRANSITION ENERGY-INTERNAL PRESSURE RELATIONS.
Technical rept.,
by John E. Gordon. 26 Jan 66, 7p WHOI-Ref-66-53
Contract Nonr-2196 (00), Grant NSF-GP-5110
Availability: Published in Journal of Physical Chemistry v70 p2413-6 Jul 1966.

Descriptors: (*Electrolytes, *Chemical indicators), (*Dyes, *Electron transitions), Absorption spectrum, Solvents, Electric moments, Atomic energy levels, Salts, Pressure, Sea water.

Identifiers: Merocyanine dyes.

The visible absorption spectrum of the merocyanine dye M88 was measured in aqueous solutions of five different electrolytes, as a function of electrolyte concentration. The transition energies of the dye were found to correlate qualitatively with the electrostrictions of the salts and hence with the effect of the salts on the activity coefficients of nonpolar nonelectrolytes in water (salting-in or -out effect). The generality of solvent polarity indicator transition energy---internal pressure correlations was investigated, and a possible physical model is discussed. (Author)

AD-641 766 **Field 7D**
Not available from CFSTI.
North Carolina Univ., Chapel Hill. Dept. of Chemistry.
TWIN-ELECTRODE THIN-LAYER ELECTROCHEMISTRY: DETERMINATION OF CHEMICAL REACTION RATES BY DECAY OF STEADY-STATE CURRENT.
Revised ed.,
by Bruce McDuffie, Larry B. Anderson, and Charles N. Reilley. 31 Mar 66, 10p
Grant AF-AFOSR-584-64
Proj. AF-9760
Task 076001
AFOSR-66-1457
Revision of manuscript received 1 Feb 66.
Availability: Published in Analytical Chemistry v38 p883-90 Jun 1966.

Descriptors: (*Electrolytic cells, *Reaction kinetics), Electrochemistry, Electric currents, Concentration (Chemistry), Benzenes, Organic nitrogen compounds, Chemical reactions.

Identifiers: Rearrangement reactions.

A continuous monitor of the concentration of an electroactive species is provided by the steady-state current attainable with a twin-electrode thin-layer cell. If the concentration is disturbed by a chemical reaction, the rate of appearance or decay may be followed directly and continuously by recording the current. This principle was applied to the study of the rate of the benzidine rearrangement under varying conditions of acidity and ethanol concentration. Results covering a range of pseudo-first-order rate constants from 0.11 to 0.0022/sec. indicate general agreement with various other electrochemical methods and with a classical kinetic method. Limitations in determining rate constants outside this range are discussed. The method appears to be generally applicable in studying the rates of first-or higher-order chemical reactions following (or preceding) electron transfer. (Author)

AD-641 784 **Field 7D**
Not available from CFSTI.
Maine Univ., Orono. Dept. of Physics.
INFLUENCE OF ELECTRIC AND MAGNETIC FIELDS ON THE MOLECULAR ALIGNMENT IN THE LIQUID CRYSTAL ANISAL-p-AMINOAZOBENZENE.
Interim rept.,
by E. F. Carr. 12 Jul 65, 7p
Grant AF-AFOSR-605-64
Proj. AF-9761
Task 976102
AFOSR-66-1627
Availability: Published in Journal of Chemical Physics v43 n11 p3905-10 Dec 1 1965.

Descriptors: (*Organic nitrogen compounds, Polarization), Electric fields, Magnetic fields, Crystals, Liquids, Dielectric properties, Microwave frequency, Permeability (Magnetic), Anisotropy.

Identifiers: Anisal aminoazobenzenes, Liquid crystals.

The molecular alignment was studied for anisal-p-aminoazobenzene in the presence of external magnetic and ac electric fields. Measurements of the dielectric loss at a microwave frequency of 24 kMc/sec were used to indicate the extent of the molecular alignment. For the external fields parallel to each other, the degree of molecular alignment which could be obtained for a 370 kc/sec electric field was the same as that which could be produced by a magnetic field. For the magnetic and electric fields perpendicular to each other, the ration of E/H corresponding to a random orientation of the molecules in the plane of E and H was obtained. As the magnetic field was changed from 500 to 3000 G the ratio of E/H remained constant within the limits of experimental error. The value obtained for E/H could not be explained by assuming that the processes responsible for the molecular alignment were associated with only the anisotropy in the dielectric constant and the permeability. (Author)

AD-641 791 **Field 7D, 20B, 20L**
Not available from CFSTI.
Texas Christian Univ., Fort Worth. Dept. of Physics.
NUCLEAR MAGNETIC RESONANCE STUDIES OF PURE AND SAMARIUM-DOPED CaF2 CRYSTALS.
Doctoral thesis,
by R. J. Lysiak, and P. P. Mahendroo. 23 Nov 65, 7p
Grant AF-AFOSR-604-64
Proj. AF-9761
Task 976103
AFOSR-66-1843
Availability: Published in The Journal of Chemical Physics v44 n10 p4025-9 May 15 1966.

Descriptors: (*Calcium compounds, Nuclear magnetic resonance), (*Fluorides, Nuclear magnetic resonance), Samarium, Doping, Relaxation time.

Identifiers: Calcium fluoride.

The spin-lattice relaxation time T1 of Fluorine-19 was measured over a temperature range of 77 to 1300K in natural and synthetic CaF2 crystals and in CaF2 crystals doped with 0.05% Sm, 0.16% Sm, and 1.20% Sm. Most of the data was taken with the magnetic field along the 100 and 111 directions using the magnetic recovery method. For annealed samples T1 at room temperature and below is found to be inversely proportional to the concentration of samarium. Measurements show that in the high-temperature regions T1 is primarily governed by translational diffusion. Activation energies in the extrinsic and intrinsic regions were found to be 0.36 and 2.3 eV, respectively, for the pure sample and 0.53 and 2.4 eV for the doped samples. These are in good agreement with the activation energies obtained from conductivity measurements. The knee separating the extrinsic and intrinsic regions occured at higher temperatures as the amount of dopant was increased. The T1-vs-1/T curves had a minimum at 1120K was found to be directly proportional to temperature for the doped samples. The low-temperature data indicate that the correlation time of samarium at room temperature is of the order of 10 to the -14th power sec. (Author)

AD-641 847 **Field 7D, 20H, 20J**
Not available from CFSTI.
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
BIPOLAR ANGLE AVERAGES AND TWO-CENTER, TWO-PARTICLE INTEGRALS INVOLVING r sub 12,
by M. B. Milleur, M. Twerdochlib, and J. O. Hirschfelder. 14 Dec 65, 9p
Grant NsG-275-62
Availability: Published in Journal of Chemical Physics v45 n1 p13-20 Jul 1 1966.

Descriptors: (*Quantum mechanics, Statistical functions), (*Statistical mechanics, Functions), (*Statistical functions, Particles), Special functions (Mathematical), Integrals, Analytic geometry, Harmonic analysis.

Derivation is made of a set of bipolar angle average-weight functions which lead to a simple and general relation for the bipolar angle average of a function f (r sub a1, r sub b2, r sub 12, R). These bipolar angle averages simplify the determination of two-center two-particle integrals.

AD-641 848 **Field 7D, 20I, 4A**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Research Labs., Pittsburgh, Pa.

KINETIC ENERGY DISTRIBUTION OF NEGATIVE IONS FORMED BY DISSOCIATIVE ATTACHMENT AND THE MEASUREMENT OF THE ELECTRON AFFINITY OF OXYGEN.
Technical rept.,
by P. J. Chantry, and G. J. Schulz. 3 Oct 66, 43p
TR-34, 66-9E3-113-P3
Contract Nonr-2584 (00), ARPA Order-125-63
Proj. 4720

Descriptors: (*Gas ionization, Kinetic energy), (*Oxygen, Gas ionization), Dissociation, Electron bombardment, Statistical distributions, Electrons, Energy, Probability, Electron beams.

The kinetic energy distribution of ions produced by a dissociative ionization process is derived, taking into account the effect of thermal motion of the target molecule. In the case of dissociative attachment of monoenergetic electrons to a diatomic molecule the width at half maximum of the negative ion energy distribution is given by sq.rt. (11 (Beta)kTE) where Beta is the ratio of the mass of the ion to that of the parent molecule, T is the target gas temperature, and E is the most probable ion energy. Using a crossed field velocity filter O (-) ion energy distributions arising from the attachment of essentially monoenergetic electrons to O2 are s died as a function of electron energy at two gas temperatures. The measured widths of the distributions are consistent with the above relationship. Measurements of E as a function of the electron energy allow a determination of the electron affinity, A, of atomic oxygen. The result, A = 1.5 plus or minus 0.1 eV, is in excellent agreement with photodetachment threshold determinations. (Author)

AD-641 863 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
POPULATION INVERSION IN ADIABATIC EXPANSION OF A GAS MIXTURE,
by V. K. Konyukhov, and A. M. Prokhorov. 12 Sep 66, 6p ATD-66-115
TT-66-62588
Trans. of Zhurnal Eksperimentalnoi i Teoreticheskoi Fiziki. Pisma v Redaktsiyu (USSR), v3 n11 p436-9 1966.

Descriptors: (*Gases, Excitation), (*Molecular energy levels, Gases), Mixtures, Relaxation time, Population (Mathematics), Probability, USSR, Adiabatic gas flow.

The paper shows that adiabatic expansion of certain mixtures of molecular gases gives rise to the condition of population inversion in terms of vibrational levels existing for a certain time. To achieve this the molecules of the mixture should have substantially different vibrational relaxation times and should be capable of exchanging the energy of the vibrational excitation. (Author)

AD-641 867 **Field 7D, 11I, 20M**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., White Oak, Md. Non-Metallic Materials Div.
THERMODYNAMIC PROPERTIES OF POLYBUTENE-1 AND BUTENE-1,
by R. W. Warfield, and M. C. Petree. 20 Sep 66, 18p
Proj. R-360-FR-105
NOLTR-66-171

Descriptors: (*Polyethylene plastics, Thermal properties), (*Alkenes, Thermal properties), Thermodynamics, Entropy, Enthalpy, Phase studies, Specific heat, Polymerization, Heat of reaction.

Identifiers: Butenes, Polybutylenes, Free energy, Encraty.

Using published specific heat data, the entropy, enthalpy, and Gibbs free energy of polybutene-1 (PB) were calculated over the temperature range 0 to 315K. The encraty, C sub p/T vs. T, calculated for PB exhibits a maximum at 60K and a small inflection at about 250K, which is associated with the glass transition. The difference, C sub p-C sub v, was calculated at 298.15K and found to be 0.047 cal/gm deg. The thermodynamic functions were also calculated for butene-1. At 265K the entropy of polymerization is 32.57 cal/mole deg, and the free energy of polymerization was found to be -12.1 kcal/mole. (Author)

NBS-NSRDS-7 **Field 7D, 7B**
CFSTI Prices: HC$0.35 MF$0.50
National Bureau of Standards, Washington, D. C. Inst. for Basic Standards.
HIGH TEMPERATURE PROPERTIES AND DECOMPOSITION OF INORGANIC SALTS. PART 1. SULFATES,
by K. H. Stern, and E. L. Weise. 1 Oct 66, 46p

Descriptors: (*Sulfates, *Thermochemistry), Decomposition, Thermal stability, Chemical equilibrium, Vapor pressure, Phase studies, Reaction kinetics, Density, Tables, Reviews.

Identifiers: Free energy.

The literature dealing with the high-temperature behavior of inorganic sulfates is critically reviewed. Free energy functions of reactants and products of the decomposition reactions were calculated and tabulated from 298K up to as high a temperature as possible. Free energy functions, equilibrium constants of reactions, and partial pressures of gaseous components are tabulated. Auxiliary data on phase transitions, densities, and kinetics of chemical decomposition are also included. (Author)

NBS-TN-346 **Field 7D**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Boulder, Colo. Radio Standards Lab.
ON THE NATURAL SHIFT OF A RESONANCE FREQUENCY,
by Robert J. Harrach. 29 Sep 66, 32p
Also available from Superintendent of Documents, GPO, Washington, D. C., 20402 $0.25.

Descriptors: (*Thallium, Molecular beams), (*Molecular beams, Frequency shift), Resonance, Electron transitions, Atomic energy levels, Magnetic moments, Magnetic fields.

The natural resonance frequency shift, caused by the transition-inducing radiation field, is examined for a magnetic dipole transition between hyperfine structure levels in the ground state of a thallium atom. A calculation predicts, for an atomic beam experiment, a natural shift magnitude of 1.4 parts in ten billion of the thallium resonance frequency, per mW/Oe. In the experiment, frequency shifts caused by overlap of neighboring resonances were observed, but the natural shift was unresolved, indicating that its size is more than an order of magnitude below the calculated value. Subsequently it was shown that the natural shift was inhibited by the particular radiation field mode used in the experiment. When the theory correctly takes this mode into account, the calculated natural frequency shift is consistent with the experimental results. (Author)

N66-33168 **Field 7D**
CFSTI Prices HC$3.00 MF$0.75
Chicago Univ., Ill. Enrico Fermi Institute For Nuclear Studies.
CHEMICAL ANALYSIS OF SURFACES USING ALPHA PARTICLES.
by E. Franzgrote, J. H. Patterson, and A. L. Turkevich. Jul 64, 79p NASA-CR-59458, EFINS-64-42
Grant NSG-127-61
Submitted For Publication

Descriptors: *Alpha particle, *Chemical analysis, *Particle detector, *Surface property, Alpha, Analysis, Analyzer, Chemical, Curium 242, Detector, Energy, Height, Instrument, Interaction, Nuclide, Particle, Property, Pulse, Radioactivity, Scattering, Semiconductor, Silicon, Source, Spectrum, Surface.

For abstract, see STAR 04 19.

N66-33367 **Field 7D**
CFSTI Prices HC$2.00 MF$0.50
Princeton Univ., N. J.
ABSORPTION SPECTRUM OF THE NO MOLECULE. V - SURVEY OF EXCITED STATES AND THEIR INTERACTIONS.
by K. Dressler, and E. Miescher. 1964, 39p
NASA-CR-59449
Grant NSG-414, Contract AF-EOAR-63-109
Submitted For Publication

Descriptors: *Absorption spectrum, *Excited state, *Molecular interaction, *Nitrogen oxide, Absorption, Band, Energy, Excitation, Gas, High resolution, Interaction, Isotope, Molecular, Nitrogen, Oxide, Physics, Shift, Spectrogram, Spectrum, State, Theoretical.

For abstract, see STAR 04 19.

N66-33373 **Field 7D**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration, Washington, D. C.
A NEW APPROACH TO THE HOMOGENIZATION OF HETEROGENEOUS MEDIA FOR NEUTRON DIFFUSION CALCULATIONS.
by A. Jacobs. 1960, 62p NASA-TM-X-54846
Submitted For Publication

Descriptors: *Channel, *Mathematical model, *Vacuum system, Approximation, Collision, Density, Diffusion, Equation, Flux, Heterogeneity, Mathematics, Mechanics, Medium, Model, Neutron, System, Transport, Vacuum.

For abstract, see STAR 04 19.

N66-33392 **Field 7D**
CFSTI Prices HC$1.00 MF$0.50
Rice Univ., Houston, Tex. Dept. Of Chemistry.
SUBLIMATION PRESSURES OF REFRACTORY FLUORIDES.
by R. G. Bautista, G. Besenbruch, T. C. Ehlert, A. S. Kanaan, and R. A. Kent. 1966, 14p NASA-CR-77001
Grant NSG-6

Descriptors: *Fluoride, *Refractory metal, *Sublimation, *Vapor pressure, Absolute, Atomization, Bond, Energy, Heat, Identification, Metal, Pressure, Refractory, Species, Vapor.

For abstract, see STAR 04 19.

N66-33487 **Field 7D**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
USE OF A FLUIDIC OSCILLATOR AS A HUMIDITY SENSOR FOR A HYDROGEN-STEAM MIXTURE.
by P. R. Prokopius. Aug 66, 14p NASA-TM-X-1269
Contract 123-34-02-01-22

Descriptors: *Fuel cell, *Humidity measurement, Cell, Fluid, Fuel, Humidity, Hydrogen, Measurement, Molecular, Oscillator, Oxygen, Sensitivity, Sensor, Steam, Weight.

For abstract, see STAR 04 19.

N66-33681 **Field 7D**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
THE PROBLEM OF THE VOLATILITY OF NIOBIUM OXIDES.
K Voprosu O Letuchesti Okislov Niobiya
by I. V. Golubtsov, A. V. Lapitskiy, and V. K. Shiryayev. Jun 66, 12p NASA-TT-F-10224
Transl. Into English From Izv. Vyssh. Ucheb. Zaved., Khim. I Khim. Tekhnol. (Moscow), No. 4, 1960 P 571-574 Presented At 1st Interinst. Of Higher Learning Conf. On Radiochem., Moscow, 20-25 Apr. 1959

Descriptors: *Knudsen cell, *Niobium oxide, *Vapor pressure, *Volatility, Cell, Chamber, Dioxide, Dissociation, Effusion, Isotope, Niobium, Niobium 95, Oxide, Pentoxide, Pressure, Radioactivity, Saturation, Thermal, Trace, Vapor.

For abstract, see STAR 04 19.

N66-37904 **Field 7D**
CFSTI Prices HC$1.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
AN APPLICATION OF HIRSCHFELDER- SILBEY PERTURBATION THEORY TO THE H2 PLUS ION.
by R. B. Hake, J. O. Hirschfelder, and R. J. Silbey. 18 Aug 66, 24p NASA-CR-78445, WIS-TCI-180
Grant NSG-275

Descriptors: *Hydrogen ion, *Perturbation theory, Atom, Energy, Equation, Method, Molecular, Orbit, Positive, Variation, Wave.

For abstract, see STAR 04 23.

N66-38789 **Field 7D**
CFSTI Prices HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
DENSITY, VAPOR PRESSURE, AND VISCOSITY OF SOLUTIONS OF HYDRAZINE MONONITRATE IN HYDRAZINE.
by J. B. Krasinsky, and S. P. Vango. 15 Oct 62, 19p NASA-CR-78593, JPL-TM-33-103
Contract NAS7-100

Descriptors: *Density measurement, *Hydrazine, *Vapor pressure, *Viscosity, Anhydrous, Apparatus, Decomposition, Fuel, Preparation, Rocket, Solution, Temperature, Water.

For abstract, see STAR 04 23.

PB-173 383 **Field 7D**
CFSTI Prices: HC$4.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDE COMPAREE PAR SPECTROMETRIE INFRA-ROUGE DU COMPORTEMENT DE GROUPEMENTS Y-H ET Y-D. FREQUENCES DE VALENCE ET CONSTANTES D'ASSOCIATION MOLECULAIRE (Comparative Study of Infra-red Spectrometry of the Behaviour of Y-H and Y-D Groups. Valencies Frequency and Molecular Association Constants).
Doctoral thesis in French,
by Jean-Pierre Leicknam. Feb 66, 108p CEA-R-2924
Text in French; Attached summary in English.

Descriptors: (*Infrared spectroscopy, Isotopes), (*Valence, Infrared spectroscopy), (*Molecular association, Infrared spectroscopy), Chemical bonds, Hydrogen compounds, Deuterated compounds, Vibration, Solutions, Chemical equilibrium, Thermochemistry, Complex compounds, France.

A comparison was made of the relative lowerings of the frequencies determined using homologous hydrogenated and deuterated vibrators dissolved in various solvents, with the gaseous state as reference. Certain results suggest the existence of interactions between vibrational and electronic states, but the different behaviours of OH and OD molecules and of NH and deuterated-N compounds show that the phenomenon is complex. A quantitative examination was made of about a hundred molecular associations which are formed in solution in an inert solvent by means of hydrogen or deuterium bridges. The proton and deuton donor auto-associations are studied first of all, the association constants K (H) are then determined for the proton donors with various acceptors, as are the K (D)/K (H) ratios obtained after partial substitution in these donors of the hydrogen by deuterium. The results show that it is necessary to distinguish thermo-dynamic effects (which can be calculated when all frequencies of the free dynamic and complexed molecules are known) and chemical effects connected with the nature of the donors and acceptors; among these latter, the possible formation of 'ionic pairs' has without doubt a great influence on the direction of the isotopic effect. (Author)

PB-173 391 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
PREPARATION, DEFINITION ET STABILISATION PAR UNE MACROMOLECULE ORGANIQUE D'UN SOL MINERAL: CAS D'UN COLLOIDE D'HYDROXYDE D'ALUMINIUM (Preparation' Definition and Stabilization of an Inorganic Sol by an Organic Macromolecule: Case of an Aluminium Hydroxide Colloid).
Doctoral thesis in French,
by Andree Hurbin-Faucon. Mar 66, 88p CEA-R-3044
Text in French; Attached summary in English.

Descriptors: (*Colloids, Preparation), (*Aluminium compounds, Colloids), Hydroxides, Polymerization, Condensation reactions, Gelatins, Refractive index, Ionization, Electrolysis, Polymers, Metalorganic compounds, Complex compounds, Stability, pH, Gels, France.

Identifiers: Aluminium hydroxide.

An attempt was made to define an aluminium colloid which is resistant to a high ionic force and to analyse, in the case of this system, the possibilities and the limits of certain techniques used in the physical chemistry of colloids. The aluminium colloid was obtained by peptisation of an aluminium hydroxide precipitate. (Author)

PB-173 396 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
MECANISME D'EXTRACTION DE L'ACIDE NITRIQUE ET DE L'EAU PAR LES SOLUTIONS ORGANIQUES D'ALCOYLAMINES TERTIAIRES (Mechanism of the Extraction of Nitric Acid and Water by Organic Solutions of Tertiary Alkylamines).
Doctoral thesis in French,
by Daniel Gourisse. Jun 66, 86p CEA-R-3005
Text in French; Attached summary in English.

Descriptors: (*Solvent extraction, *Amines), (*Nitric acid, Solvent extraction), (*Water, Solvent extraction), Organic solvents, Molecular association, Electric moments, Molecular properties, Ammonium compounds, Solutions, France.

The micellar agregation of trialkylammonium nitrates in low polarity organic solvents was verified by viscosity, conductivity and sedimentation velocity measurements. The agregation depends upon the polarity of solvent, the length of the alkyl radicals and the organic concentration of the various constituents (trialkylammonium nitrate, trialkylamine, nitric acid, water). The amine salification law was established and the excess nitric acid and water solubilities in the organic solutions were measured. Nitric acid and water are slightly more soluble in micellar organic solutions than in molecular organic solutions. A description of excess nitric acid containing trialkylammonium nitrate solutions is proposed. (Author)

PB-173 399 **Field 7D, 20M**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
PROPRIETES THERMODYNAMIQUES DU CHLORURE D'ARGENT DANS LE MELANGE EUTECTIQUE FONDU KCl-LiCl (Thermodynamic Properties of Silver Chloride in the Molten KCl-LiCl Eutectic),
by Pierre Jarny. Oct 66, 98p CEA-R-3090
Text in French; Attached summary in English.

Descriptors: (*Silver compounds, Thermodynamics), (*Chlorides, Eutectics), Potassium compounds, Lithium compounds, Electrochemistry, Entropy, Enthalpy, Solutions, Concentration (Chemistry), France.

Identifiers: Fused salts, Silver chloride.

The e.m.f. of the cell: Ag/AgCl (X).KCl-LiCl (eut)/Cl2/C was measured for mole fractions of between 0.0001 and 1, and for temperatures of between 400 and 500C. From the function E = F (X,T) are deduced: (1) the partial molar entropy of silver chloride; (2) the partial molar enthalpy of silver chloride; (3) the activities of the solute and of the solvent. By assuming that a short-distance order exists in the molten mixture, one arrives at the preceding results, by calculation. In particular an expression is deduced for the activity coefficient which is valid for all concentrations and temperatures compatible with the system's liquide state. (Author)

AD-286 698 **See Field 10B**

AD-454 676 **See Field 21D**

AD-456 624 **See Field 20I**

AD-457 119 **See Field 20E**

AD-461 769 **See Field 20I**

AD-641 394 **See Field 14B**

AD-641 412 **See Field 10B**

AD-641 467 **See Field 20H**

AD-641 575 **See Field 7C**

AD-641 694 **See Field 20F**

AD-641 789 **See Field 20C**

AD-641 842 **See Field 20D**

AD-641 986 **See Field 14B**

PB-173 395 **See Field 14B**

PB-173 429 **See Field 4A**

7E. RADIO AND RADIATION CHEMISTRY

AD-641 811 **Field 7E, 20L, 20I**
Not available from CFSTI.
Rochester Univ., N. Y. Dept. of Physics and Astronomy.
DIRECT RADIATIVE EXCITON-EXCITON ANNIHILATION,
by R. S. Knox, and C. E. Swenberg. 15 Nov 65, 5p
Grant AF-AFOSR-611-64

Proj. AF-9761
Task 976101
AFOSR-66-1302
Availability: Published in Journal of Chemical Physics v44 n7 p2577-80 Apr 1 1966.

Descriptors: (*Fluorescence, Emissivity), (*Carriers (Semiconductors), Excitation), Photons, Annihilation reactions, Quenching (Inhibition), Anthracenes, Molecular energy levels, Band spectrum, Quantum mechanics.

Several experiments on organic crystals have demonstrated the existance of triplet-triplet exciton annihilation in terms of fluoresence from the resulting singlet-exciton state. The possibility of direct emission of a photon from a pair of excitons is pointed out and the corresponding lifetime and bimolecular rate constant is estimated. While this decay channel for triplet-triplet collisions is very weak compared with decay into a singlet exciton in a crystal such as anthracene, the process is observable in principle as a characteristic emission with a transition probability of approx. <100,000/sec at an energy equal to that of two interacting excitons. Its rate depends strongly on the relative energies of all the molecular states involved. Conditions for observation of this emission band are discussed. (Author)

N66-38175 **Field 7E**
CFSTI Prices HC$2.00 MF$0.50
Hebrew Univ., Jerusalem (Israel). Dept. Of Physical Chemistry.
THE PHOTOCHEMICAL EVOLUTION OF OXYGEN FINAL SCIENTIFIC REPORT, 1962-1965.
by G. Stein. 30 Sep 65, 36p AD-636689
Contract AF 61/052/-655

Descriptors: *Oxygen, *Photochemistry, Analysis, Aqueous, Excitation, Gas, Hydrogen, Peroxide, Photolysis, Solution, Water.

For abstract, see STAR 04 23.

N66-38496 **Field 7E**
CFSTI Prices HC$3.00 MF$1.00
Oak Ridge National Lab., Tenn.
NASA TUNGSTEN REACTOR RADIATION CHEMISTRY STUDIES FINAL REPORT.
by E. G. Bohlmann, G. H. Jenks, and H. C. Savage. Oct 66, 120p NASA-CR-72070, ORNL-TM-1630
Sponsored By Nasa

Descriptors: *Cadmium compound, *Water moderated reactor, Cadmium, Chemistry, Control, Dynamic, Electron, Irradiation, Poison, Radiation, Stability, Static, Sulfate, Tungsten.

For abstract, see STAR 04 23.

PB-173 387 **Field 7E**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
CINETIQUE DES REACTIONS D'OXYDO-REDUCTION DES ELEMENTS TRANSURANIENS EN SOLUTION (Kinetics of Transuranium Element Oxidation-Reduction Reactions in Solution).
Doctoral thesis in French,
by Daniel Gourisse. Sep 66, 63p CEA-R-3079
Text in French; attached summary in English.

Descriptors: (*Transuranium elements, *Oxidation-reduction reactions), Uranium, Neptunium, Plutonium, Americium, Solutions, Reaction kinetics, Deuterium, Thermochemistry, Complex compounds, Heavy water, Perchloric acid.

A review of the kinetics of U, Np, Pu, Am oxidation-reduction reactions is proposed. The relations between the different activation thermodynamic functions (compensatory effect, formal entropy of the activated complex, magnitude of reactions velocities) are considered. The effects of acidity, ionic strength deuterium and mixed solvents polarity on reactions rates are described. The effect of different anions on reactions rates are explained by variations of the reaction standard free energy and variations of the activation free energy (coulombic interactions) resulting from the complexation of dissolved species by these anions. (Author)

PB-173 394 **Field 7E, 18J**
CFSTI Prices: HC$1.00 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
LA DETERMINATION POLAROGRAPHIQUE DE LA STOECHIOMETRIE DU DIOXYDE D'URANIUM (Polarographic Determination of Uranium Dioxide Stoichiometry),
by Jean-Claude Viguie, and Gisele Uny. Oct 66, 23p CEA-R-3029, MET-5/66
Text in French; Attached summary in English.

Descriptors: (*Uranium compounds, *Polarographic analysis), Dioxides, Oxidation, Volumetric analysis, Solvents, Sensitivity, France.

Identifiers: Uranous oxide.

The method described allows the determination of small deviations from stoichiometry for uranium dioxide. It was applied to the study of surface oxidation of bulk samples. The sample is dissolved in phosphoric acid under an argon atmosphere; U (VI) is determined by polarography in PO4N3 4.5 N - H2SO4 4 N. U (IV) is determined by potentiometry. The detection limit is UO2.0002. The accuracy for a single determination at the 95 per cent confidence level is plus or minus 20 per cent for samples with composition included between UO2.001 and UO2.01. (Author)

PB-173 398 **Field 7E**
CFSTI Prices: HC$4.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
METHODE DE SEPARATION DES TERRES RARES PAR ELECTROPHORESE A HAUTE TENSION SUR PAPIER - SUPPORT (Separation Method for Rare-Earths Using High-Voltage Electrophoresis on Paper Strip),
by Jeanine Clarence. Aug 66, 101p CEA-R-2877
Text in French; Attached summary in English.

Descriptors: (*Rare earth elements, Separation), (*Electrophoresis, Rare earth elements), Instrumentation, Organic solvents, Cellulose acetate, Cerium, Praseodymium, Neuodymium, Europium, Yttrium, Terbium, France.

The equipment includes an electrophoresis set running at 3000 V and 20 mA. Two cooling plates are used as heat exchanger, and a pneumatic pressure device to insure an uniform pressure on the paper strip laid flat. The mobilities and the separations of the rare earths in lactic, and alpha hydroxyisobutyric acid solutions were investigated on cellulose acetate strip. Better results were obtained with alpha hydroxyisobutyric acid. The method is rapid and allows a fine fractionation of rare earth elements within less than an hour. A complete separation of a Ce - Pr - Nd - Pm - Eu mixture, and a Y - Tb mixture was obtained. (Author)

AD-449 505 **See Field 7C**

AD-453 658 **See Field 15G**

AD-641 662 **See Field 11F**

8A. BIOLOGICAL OCEANOGRAPHY

AD-641 436 **Field 8A, 8J**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Geology and Geophysics.
SATURATED HYDROCARBONS IN MARINE PLANTS AND SEDIMENTS.
Master's thesis,
by Robert Charles Clark, Jr. Jun 66, 98p

Descriptors: (*Alkanes, Oceanology), (*Algae, Alkanes), (*Plankton, Alkanes), (*Ocean bottom, Alkanes), Hydrocarbons, Gas chromatography, Plants (Botany), Molecular structure.

Twelve species of algae from the Northeast coast of the United States, three species of planktonic algae grown in the laboratory, a pelatic algae, a recent sediment and a sample of mixed marine plankton were analyzed for normal alkane hydrocarbons over the range C14H30 to C32H66. The results: the benthic algae and mixed plankton exhibit a slight odd carbon predominance; the planktonic algae grown under controlled laboratory conditions had a slight odd carbon predominance; the recent sediment sample from Tarpaulin Cove, Mass., shows a pronounced odd carbon predominance; definite differences in hydrocarbon distribution between classes were found (The red algae, the green algae and the mixed marine plankton show a strong predominance of n-heptadecane. In the brown algae n-pentadecane predominates; the Fucules have a higher ratio of n-pentadecane to n-heptadecane than the Laminariales.); all plant samples show a hydrocarbon minimum in the n-C18H38 to n-C21H44 region and a moderate maximum in the n-C27H56 to n-C30H62 region; pristane was found in several samples but phytane was not detected. (Author)

AD-641 769 **Field 8A, 6M**
Not available from CFSTI.
Washington Univ., Seattle. Dept. of Oceanography.
COMPUTATION OF PHYTOPLANKTON CELL NUMBERS, CELL VOLUME, CELL SURFACE AND PLASMA VOLUME PER LITER, FROM MICROSCOPICAL COUNTS.
Special rept.,
by Paavo E. Kovala, and Jerry D. Larrance. Jul 66, 95p SR-38, Ref-M66-41
Contracts Nonr-477 (10), Nonr-477 (37)
Proj. NR-083 012
Supported in part by NSF and AEC.
Not reproducible by Clearinghouse Standards.

Descriptors: (*Plankton, Marine biology), Cells (Biology), Volume, Surfaces, Sea water, Cytoplasm.

The program computes concentrations of cell numbers, cell surface areas and cell and plasma volumes in marine phytoplankton populations. Also mean cell areas, mean cell volumes and mean plasma volumes as well as the ratios cell area to cell volume and cell area to plasma volume can be computed optionally. The input quantities cell numbers, cell shapes and dimensions are obtained from microscopical examination of preserved seawater samples sedimented in counting chambers. (Author)

AD-641 833 **Field 8A**
CFSTI Prices: HC$3.00 MF$0.75
Navy Electronics Lab., San Diego, Calif.
PLANKTON AND TURBIDITY.
Research and development rept. Jul 61-Mar 66,
by E. G. Barham, J. W. Wilton, and M. P. Sullivan. 1 Jul 66, 90p NEL-1386
Proj. SR-104-03-01
Task 0588

Descriptors: (*Marine biology, Light transmission), Oceans, Attenuation, Microorganisms, Plankton.

An investigation was made of time and space distribution of microorganisms and other materials producing attenuation of light in the open sea. Unicellular organisms in bloom quantities were found to reduce transmission of yellow light. Dinoflagellates were especially important during the summer

off Mission Beach, California. Light transmission was also reduced by organic material, particulate detritus, and dissolved pigments. Macroplankton were found to be less important contributors. (Author)

8B. CARTOGRAPHY

AD-641 894 **Field 8B, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Texas Instruments Inc., Dallas, Tex.
GROUND-TRUTH RESEARCH FOR AN AIRBORNE MULTISENSOR SURVEY PROGRAM.
Final rept.,
by R. Ludlum. 1 Nov 66, 98p
Contract N00014-66-C0049
Projs. NR-387-038, R0-00-101

Descriptors: (*Mapping, *Radiometers), Airborne, Terrain, Plants (Botany), Urban areas, Infrared equipment, Temperature, Emissivity, Photographic techniques, Reflection, Illinois, Multiple operation, Surveying.

The program involved (1) the testing of the applicability of the Barnes Engineering Company Model PRT 14-313 portable infrared thermometer to ground-truth measurement operations and (2) investigation of the influence of variations in sky conditions and radiometer aspect angles on radiometric temperatures and emissivity factors. Findings show that the PRT 14-313 radiometer is usable in ground-truth procedures but that design limitations very seriously reduce its effectiveness. Analysis of empirical data indicates that radiometric temperatures of foliage are more a function of environmental conditions than of sky conditions, radiometer aspect angles or leaf orientations. On samples of asphalt, concrete and soil surfaces, however, the influence of variations in sky conditions and aspect angles on radiometric temperatures is quite pronounced, and it is recommended that any attempts at emissivity determinations be conducted under clear sky at night with aspect angles near normal incidence, if possible, but in no case at aspect angles less than 50 degrees. (Author)

N66-32758 **Field 8B**
CFSTI Prices HC$2.00 MF$0.50
Kansas Univ., Lawrence. Engineering Science Div.
USE OF ORBITAL RADARS FOR GEOSCIENCE INVESTIGATIONS.
by J. W. Rouse Jr, W. P. Waite, and R. L. Walters.
Jan 66, 33p NASA-CR-76895, CRES-61-8
Contract NSR-17-004-003
Presented At 3d Space Congr., Cocoa Beach, Fla., 7-9 Mar. 1965

Descriptors: *Geology, *Imagery, *Penetration, *Radar altimeter, *Scattering, Agriculture, Altimeter, Coefficient, Cross section, Ice, Investigation, Orbital, Radar, Return, Science, Technique, Terrain, Use.

For abstract, see STAR 04 19.

N66-33765 **Field 8B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
SPACE PHOTOGRAPHY FOR THE GEOGRAPHICAL STUDY OF THE EARTH.
Kosmicheskaya Fotografiya Dlya Geograficheskogo Izucheniya Zemli
by B. V. Vinogradov. Aug 66, 27p NASA-TT-F-10246
Transl. Into English From Izv. Vsesoyuznogo Geogr. Obshchestva (Ussr), V. 98, No. 2, 1966 P 101-111

Descriptors: *Earth surface, *Geography, *Rocket photography, *Satellite photography, *Space photography, Aerial, Design, Earth, Improvement, Photography, Rocket, Satellite, Space, Surface, Transmission.

For abstract, see STAR 04 19.

PB-173 494 **Field 8B**
CFSTI Prices: HC$2.00 MF$0.50
Purdue Univ., Lafayette, Ind. Joint Highway Research Project.
AIRPHOTO INTERPRETATION OF ENGINEERING SOILS OF ALLEN COUNTY, INDIANA.
Final rept.,
by D. G. Shurig. 23 Jun 66, 41p
Proj. C-36-51B
Availability: Reference only at CFSTI after orginal stock is exhausted.

Descriptors: (*Soils, Mapping), (*Aerial photographs, Photointerpretation), Cortography, Soil mechanics, Roads.

This report completes a portion of the project concerned with development of county engineering soils maps of the State of Indiana. The soils mapping of Allen County was performed primarily by using annotated aerial photographs produced as field surveys by the Soil Conservation Service. Several soil profiles were sampled by the Soil Conservation Service and the Indiana State Highway Commission. Engineering test data on various soil horizons are included in the report. The Engineering Soils Map is presented as a blackline print.

PB-173 498 **Field 8B**
CFSTI Prices: HC$1.10 MF$0.50
Purdue Univ., Lafayette, Ind. Joint Highway Research Project.
COUNTY ENGINEERING SOILS MAPS.
Final summary rept. Mar 60-Dec 65.
Jul 66, 8p
See also PB-173 487.

Descriptors: (*Soils, Mapping), (*Aerial photographs, Photointerpretation), Cartography, Soil mechanics, Roads.

Personnel of the Joint Highway Research Project (JHRP) tested the soil samples, prepared soil test summary reports and reviewed the engineering chapter by the agricultural engineers of Soil Conservation Service (SCS). The soil test data were also used in the county engineering soil reports prepared by personnel of the JHRP. These reports are prepared by using aerial photographs and airphoto interpretation techniques to delineate soil areas. The engineering soils mapping project on a county basis had been active since 1943. The soil testing and soil mapping programs were therefore compatible and mutually supporting. The engineering soil mapping and the engineering soil testing for SCS were both included in the HRP project in Indiana.

AD-641 363 **See Field 20L**

8C. DYNAMIC OCEANOGRAPHY

AD-641 330 **Field 8C, 4B**
CFSTI Prices: HC$3.00 MF$0.75
RAND Corp., Santa Monica, Calif.
A NUMERICAL STUDY OF THE WIND-DRIVEN TRANSIENT CIRCULATION IN A HOMOGENEOUS OCEAN,
by W. L. Gates. Oct 66, 75p P-3455
Prepared for publication in Deep-Sea Research and Oceanographic Abstracts.

Descriptors: (*Numerical analysis, *Ocean waves), (*Atmospheric motion, Ocean waves), Equations of motion.

The primitive hydrostatic equations for a homogeneous incompressible ocean are formulated in terms of the vertically integrated flow and a variable free water surface. A rectangular ocean 4000 km by 5920 km with a uniform undisturbed depth of 400 m is considered on a beta-plane, with a lateral boundary condition of zero slip. From an initial state of rest, the development of the circulation and deformation of the free surface is followed for 60 days with a space-staggered finite-difference grid of 80 km mesh size. For an assumed wind stress varying only as the cosine of the north-south coordinate with maxima at the northern and southern boundaries, a generally clockwise ocean circulation is established in the first few days, and persists throughout the calculation. A piling of water of the order of 1 m occurs near the western ocean shore, and is in approximate geostrophic equilibrium with an intense northward boundary current (whose speed is of the order of 1 m sec-1) and a weaker offshore southward countercurrent. Frictional dissipation is assumed in the form of lateral eddy diffusion, with a constant coefficient of 10 to the 8th sq cm sec-1.

AD-641 403 **Field 8C, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Navy Electronics Lab., San Diego, Calif.
DIFFUSION IN HYDRODYNAMIC MODELS OF STRATIFIED FLUIDS.
Research rept. Jan-Sep 62,
by A. A. Hudimac, R. B. Rayment, and R. R. Smith. 26 Jul 66, 22p NEL-1393
Proj. SR-104-03-01
Task 0594

Descriptors: (*Ocean models, *Diffusion), Conductivity, Solutions, Fluids, Ocean waves, Measurement.

Identifiers: Stratified media.

A solution is presented to the problem of the obliteration of discrete layers by diffusion. A technique is devised for measuring concentration at several points along a vertical line with minimum disturbance to the layer system. Conductivity measurements with a special microcell are employed. Results of the experiments are compared with theoretical curves, and close agreement validates the theory, which is applicable to a wide range of similar problems. (Author)

AD-641 732 **Field 8C**
Not available from CFSTI.
Massachusetts Inst. of Tech., Cambridge. Dept. of Mathematics.
A NOTE ON THE WESTERN INTENSIFICATION OF THE OCEANIC CIRCULATION,
by Joseph Pedlosky. 21 Jul 65, 7p
Grant AF-AFOSR-492-64
Proj. AF-9749
Task 974901
AFOSR-66-0242
Availability: Published in Sears Foundation: Journal of Marine Research v23 n3 p207-9 Sep 15 1965.

Descriptors: (*Oceans, Fluid flow), Ocean waves, Mathematical analysis, Boundary layer, Ocean currents.

The purpose of the paper is to provide a simple physical explanation for the westward intensification of the oceanic circulation found in the several dynamically different existing theoretical models of Stommel 1948, and Carrier and Robinson 1962. It has the advantage of showing why the western oceanic boundary is singled out as the boundary-layer region that closes the interior Sverdrup solution. Consider the fundamental characteristics of Rossby waves. Energy at small scales will be transmitted to the east while energy at large scales will move to the west. For slow, large-scale geophysical systems, such as the ocean, the group velocity of Rossby waves is the significant signal velocity. Now, suppose energy of varying scales is put into the ocean, perhaps by the action of a wind stress. The short-scale components will move toward the eastern boundary of the ocean, where they will be reflected as components of a large east-west scale. Meanwhile, the large-scale components will move toward the western boundary, where they will be reflected as small-scale mo-

tions. Thus, it is the western boundary that acts as a source of small-scale motions. This is the fundamental reason for the preference for the westward intensification. (Author)

AD-641 849 **Field 8C**
CFSTI Prices: HC$4.00 MF$0.75
National Engineering Science Co., McLean, Va.
MODIFICATION OF WAVE SPECTRA ON THE CONTINENTAL SHELF AND IN THE SURF ZONE.
Final rept.,
by Charles L. Bretschneider, and Bernard Le Mehaute. 1 Oct 66, 113p SN-134-16
Contract Nonr-4177 (00)

Descriptors: (*Ocean waves, Fluid mechanics), Seacoast, Reports, Abstracts, Ocean currents, Theory.

A study was made to increase the state of the art on wave forecasting over the continental shelf, in shallow water, and in the surf zone. The study includes investigations of certain dynamic actions such as breaking waves and currents which affect the rate of littoral drift; storm surge and flooding, which result in an increase in total water depth, thereby permitting larger breaking waves to occur closer to the shoreline. Theory, field data, and analytical methods are required for the successful completion of the study. (Author)

AD-641 372 **See Field 13J**

8D. GEOCHEMISTRY

N66-34044 **Field 8D**
CFSTI Prices HC$6.00 MF$1.50
General Dynamics Corp., San Diego, Calif. John Jay Hopkins Lab. For Pure And Applied
METEORITIC, SOLAR, AND TERRESTRIAL RARE-EARTH DISTRIBUTION.
by F. A. Frey, L. A. Haskin, R. A. Schmitt, and R. H. Smith. 15 Dec 65, 270p NASA-CR-77139, GA-6800
Contracts NASW-843, NR-083-180
Submitted For Publication

Descriptors: *Extraterrestrial matter, *Meteoritic composition, *Rare earth, Chondrite, Composition, Distribution, Earth, Element, Extraterrestrial, Igneous, Iron, Lanthanide, Material, Matter, Meteorite, Rare, Rock, Solar, Terrestrial.

For abstract, see STAR 04 19.

8E. GEODESY

AD-641 342 **Field 8E**
CFSTI Prices: HC$8.60 MF$0.75
Ballistic Research Labs., Aberdeen Proving Ground, Md.
SPATIAL TRIANGULATION BY MEANS OF PHOTOGRAMMETRY,
by H. Schmid. Oct 51, 83p BRL-784
Proj. TB3-0838

Descriptors: (*Photogrammetry, *Geodesics), Aerial photographs.

Identifiers: Triangulation.

A method of precision spatial triangulation based on the principles of ground photogrammetry is outlined. The geometry and the least squares adjustment for the orientation of an individual photogrammetric camera are derived and the mathematical analysis for the spatial triangulation by means of intersection photogrammetry is given. Numerical examples are added for the major steps of the developed method. (Author)

AD-641 347 **Field 8E**
CFSTI Prices: HC$3.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
ERROR THEORY OF INTERSECTION PHOTOGRAMMETRY,
by H. Schmid. Dec 51, 32p Rept. no. BRL-785
Proj. TB3-0838

Descriptors: (*Photogrammetry, *Errors), Theory, Photographic equipment.

Identifiers: Triangulation.

Formulas are developed for evaluating the propagation of the various errors present in a system of photogrammetric cameras in triangulating the space position of a photographed point. (Author)

AD-641 386 **Field 8E, 9B**
CFSTI Prices: HC$5.00 MF$1.00
Ballistic Research Labs., Aberdeen Proving Ground, Md.
BRLESC FORTRAN II COMPUTER PROGRAMS FOR ANALYTICAL SOLUTIONS OF THE GENERAL PROBLEM OF PHOTOGRAMMETRY.
Memorandum rept.,
by Lila M. Butler. Jul 66, 149p BRL-MR-1769
Proj. RDT/E-1P523801A286

Descriptors: (*Photogrammetry, *Programming (Computers)).

An analytical treatment of the general problem of photogrammetry, using the Schmid method, for the Single Camera Orientation, the Single Model Orientation and the Strip Triangulation have been programmed in BRLESC FORTRAN II. Slight modifications have been made in the Single Camera and Single Model programs for the computation of individual mean errors of unit weight for plate coordinates and known point coordinates. Input, output, operating instructions and test runs are provided for the various programs. All these FORTRAN II programs follow the flow diagrams for the FORAST programs which are found in the reports mentioned in the abstract of this report. All input data are compatible.

AD-641 753 **Field 8E**
CFSTI Prices: HC$4.00 MF$1.00
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
RESEARCH IN GEODETIC GRAVIMETRY,
by M. S. Molodenskii, V. F. Eremeev, A. L. Bayborodin, and L. P. Pellinen. Aug 66, 138p ACIC-TC-1043
TT-66-62581
Issledovaniya po Geodezicheskoi Gravimetrii, trans. of Tsentralnyi Nauchno-Issledovatelskii Institut Geodezii, Aerosemki i Kartografii. Trudy (USSR) v86 96p 1951.

Descriptors: (*Geodesics, *Gravity), Data processing systems, Earth (Planet), Mathematical analysis, USSR.

Contents: Method of joint processing gravimetric and geodetic data for the study of the earth's gravitational field and its figure, by M. S. Molodenskiy; The theory of orthometric, dynamic and normal heights, by V. F. Yeremeyev; On the question concerning the derivation of errors of representation and interpolation, by A. L. Bayborodin; Investigation of the plumb-line deviations and derivation of the quasigeoidal figure in the caucasus, by L. P. Pellinen.

AD-641 757 **Field 8E**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
ON CORRECTIONS FOR GRAVITY DURING LEVELING IN A HIGH-MOUNTAIN REGION.
Technical translation,
by M. I. Yurkina, and E. I. Krotkov. Oct 66, 10p ACIC-TC-1133
TT-66-62585
O Popravkakh za Silu Tyazhesti pri Nivelirovanii v Vysokogornom Raione, trans. of Geodeziya i Kartografiya (USSR), n10 p3-7 1965.

Descriptors: (*Surveying, Corrections), USSR, Mountains, Gravity.

AD-641 963 **Field 8E, 9B, 16B**
CFSTI Prices: HC$1.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE PREPARATION OF A THEODOLITE PROBLEM FOR LARGE SCALE COMPUTING MACHINES.
Memo rept.,
by B. Dimsdale, and M. A. Powers. May 51, 12p BRL-MR-543
Proj. TB3-0838

Descriptors: (*Geodesics, *Programming (Computers)), Theodolites, Position finding, Guided missiles.

In solving problems on modern machines without floating decimal it is necessary to have fairly good bounds on the various variables entering into the computation. The theodolite problem geometrically is the problem of triangulation from n stations. For the method in use, very close bounds are given on all the variables of the problem. For the most critical of these, bounds are given in terms of a quantity which serves as a criterion of parallelism of n lines. (Author)

AD-641 979 **Field 8E, 16B**
CFSTI Prices: HC$1.10 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN ALTERNATE SOLUTION FOR THE INTERSECTION PROBLEM.
Memorandum rept.,
by H. Schmid. Dec 51, 7p BRL-MR-574
Proj. TB3-0838

Descriptors: (*Geodesics, *Vector analysis), Trigonometry, Numerical analysis, Position finding.

The intersection problem for two measuring stations is treated by vector analysis. It is shown that the resulting evaluation formulas may be derived independently by trigonometric analysis. (Author)

N66-38177 **Field 8E, 8G**
CFSTI Prices HC$1.00 MF$0.50
Defence Research Board, Ottawa (Ontario). Directorate Of Scientific Information
ALTERNATING FIELD DEMAGNETIZATION STUDY ON LOWER SINIAN SANDSTONES IN XIUNING HSIUNING DISTRICT, ANHUI ANHWEI PROVINCE.
by L. Chun, and F. Hao. May 66, 13p T-7-C, TT-66-62025
Transl. Into English From Ti Ch'iu Wu Li Hsueh Pao (Peking), V. 14, No. 3, Sep. 1965 P 173-180

Descriptors: *Geomagnetism, *Magnetic property, *Sandstone, Alternating, Demagnetization, Field, Paleomagnetism, Petrology, Stratigraphy.

For abstract, see STAR 04 23.

AD-641 396 **See Field 20D**

8F. GEOGRAPHY

AD-641 756 **Field 8F**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
GRAVITATIONAL DEVELOPMENT OF SLOPES.
Technical translation,
by A. M. Trofimov. Oct 66, 6p ACIC-TC-1129
TT-66-62584

O Gravitatsionnom Razvitii Sklonov, trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Geologiya i Razvedka (USSR), v9 n7 p30-31 1966.

Descriptors: (*Rheology, Gravity), (*Terrain, Rheology), Mathematical analysis, USSR.

Equations are derived for computing the morphometric characteristics of slopes.

AD-641 747 **See Field 6F**

AD-641 894 **See Field 8B**

8G. GEOLOGY AND MINERALOGY

AD-641 402 **Field 8G**
CFSTI Prices: HC$3.00 MF$0.75
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
GEOLOGY AND GEOMORPHOLOGY OF THE COASTAL PLAIN RIO GRANDE DO SUL, BRAZIL AND NORTHERN URGUAY.
Technical rept.,
by Patrick J. V. Delaney. 15 Jul 66, 71p TR-18-Pt-B, Contrib-66-6
Contract Nonr-1575 (03)
Proj. NR-388-002
Rept. on South American Coastal Studies. Prepared in cooperation with Universidade do Rio Grande do Sul, Porto Alegre (Brazil). See also AD-400 747.

Descriptors: (*Geology, *Brazil), South America, Stratigraphy, Maps.

Identifiers: Geomorphology, Uruguay.

This paper, the second in a series describing the geology and geomorphology of the coastal plain of Rio Grande do Sul, Brazil and northern Uruguay, is primarily concerned with the geographic distribution of stratigraphic units within the area. To accomplish this objective, the entire coastal plain - an area of 47,100 square kilometers or 18,200 square miles - has been mapped using the scale 1:500,000. In general, this area is a low, sandy plain whose western margin is formed by higher land which is composed of rocks ranging in age from pre-Cambrian to Jurassic. The surface sediments within the coastal plain are described and mapped for the first time. They are Quaternary in age. Regional mapping of the entire area has led to a somewhat different interpretation of the geologic history than was advanced in an earlier report by the writer. The most significant change involves modification of the concept of Recent faulting in the coastal plain. (Author)

AD-641 706 **Field 8G**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
A MINERAL TRANSITION IN ATMOSPHERIC DUST TRANSPORT,
by G. F. Riedmuller, and T. L. Barber. Aug 66, 26p
Task DA-1P620901A199-05
ECOM-5072

Descriptors: (*Minerals, Infrared spectroscopy), Dust, Airborne, Absorption spectrum, Identification.

The minerals mirabilite and thenardite differ only in number of waters of crystallization, and may easily change from one state to the other. The identification of the minerals in airborne dust by infrared absorption spectroscopy and the rapidity of the transition are discussed. (Author)

AD-641 754 **Field 8G**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
ABYSSAL STRUCTURE OF THE BALTIC SHIELD ACCORDING TO GEOPHYSICAL INVESTIGATION DATA.
Technical translation,
by L. E. Shustova. Sep 66, 18p ACIC-TC-1109 TT-66-62582
Glubinnoe Stroienie Baltiiskego Shchita po Dannym Geofizicheskich Issledovanii, trans. of Sovetskaya Geologiya (USSR), v9 n5 p47-57 1966.

Descriptors: (*Structural geology, Western Europe), USSR, Rock (Geology), Density.

The paper discusses the block structure of the earth's crust of the Baltic shield.

N66-33177 **Field 8G**
CFSTI Prices HC$3.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON THE EARLY HISTORY OF THE EARTH.
by B. D. Donn, W. L. Donn, and W. G. Valentine. 1964, 65p NASA-TM-X-54900
Submitted For Publication

Descriptors: *Earth, *Geology, *History, Accretion, Accumulation, Age, Astrophysics, Composition, Continent, Erosion, Evolution, Formation, Luminosity, Origin, Rate, Rock, Solar, Star, Sun, Temperature.

For abstract, see STAR 04 19.

N66-33412 **Field 8G**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COSMOGENIC RADIOACTIVITIES IN THE PEACE RIVER AND HARLETON CHONDRITES.
by P. J. Cressy Jr, and J. P. Shedlovsky. 1964, 17p NASA-TM-X-54825
Contract AT/30-1/-844
Submitted For Publication

Descriptors: *Chondrite, *Meteoritic composition, *Radioactive nuclide, Activity, Bruderheim meteorite, Composition, Cosmic, Harleton meteorite, Isotope, Manganese, Meteorite, Nuclide, Orbit, Radiation, Radioactivity, Ratio, Size, Sodium.

For abstract, see STAR 04 19.

N66-33442 **Field 8G**
CFSTI Prices HC$2.00 MF$0.50
Howard Univ., Washington, D. C. Dept. Of Physics.
INVESTIGATION OF INFRA-RED ABSORPTION AND LOW ANGLE X-RAY SCATTERING OF TEKTITES SEMIANNUAL STATUS REPORT, 1 DEC. 1965 - 30 JUN. 1966.
Jul 66, 26p NASA-CR-77049
Contract NGR-09-11-006

Descriptors: *Absorption spectrum, *Infrared spectrum, *Tektite, *Water content, *X-ray scattering, Absorption, Angle, Beer law, Content, Glass, Infrared, Iron, Low, Obsidian, Scattering, Spectrum, Spherule, Technique, Water, X-ray.

For abstract, see STAR 04 19.

N66-38296 **Field 8G, 8K, 9B**
CFSTI Prices HC$3.00 MF$0.50
Uppsala Univ. (Sweden). Seismological Inst.
MULTICHANNEL Z-TRANSFORMS AND MINIMUM-DELAY SCIENTIFIC REPORT NO. 35.
by E. A. Robinson. 29 Mar 66, 51p AFCRL-66-506, AD-636430
Contracts AF 61/052/-702, ARPA ORDER 292

Descriptors: *Data processing, *Seismology, *Time delay, *Z transform, Building, Delay, Digital, Minimum, Model, Multichannel, Propagation, Statistical, Wave.

For abstract, see STAR 04 23.

AD-641 363 **See Field 20L**

AD-641 405 **See Field 5A**

AD-641 911 **See Field 11B**

AD-641 976 **See Field 8J**

N66-38177 **See Field 8E**

8H. HYDROLOGY AND LIMNOLOGY

NBS-MP-280 **Field 8H, 20D**
CFSTI Prices: HC$1.50 MF$1.25
National Bureau of Standards, Washington, D. C.
HYDRAULIC RESEARCH IN THE UNITED STATES 1966,
by Helen K. Middleton, and Gershon Kulin. 8 Sep 66, 258p
Includes contributions from Canadian Laboratories. Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $1.50.

Descriptors: (*Hydraulic systems, Scientific research), (*Hydrology, Bibliographies), United States, Rivers, Fluid mechanics, Abstracts, Aerodynamics, Drainage, Dams, Fluid dynamic properties.

The information contained in the publication was compiled from reports by the various hydraulic and hydrologic laboratories in the United States and Canada.

N66-33720 **Field 8H**
CFSTI Prices HC$2.50 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
BIBLIOGRAPHY ON GROUND-WATER POLLUTION AND WASTE WATER PURIFICATION.
Bibliografie Gronndwaterverontreinigi
ng En Afvalwaterzuivering
by G. De vries. Jul 66, 57p NASA-TT-F-10215
Transl. Into English From Dutch

Descriptors: *Bibliography, *Pollution, *Water purification, Abstract, Ground, Holland, Literature, Purification, Recovery, Waste, Water.

For abstract, see STAR 04 19.

PB-173 435 **Field 8H**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Reclamation, Denver, Colo. Soils Engineering Branch.
ELECTRICAL POTENTIAL FROM WATER-FLOW IN SOIL SPECIMENS--LOWER COST CANAL LINING PROGRAM.
Progress rept. no. 1,
by D. A. Tiedemann. 28 Jun 66, 28p EM-735

Descriptors: (*Inland waterways, Leakage (Fluid)), (*Voltage, Fluid flow), Test equipment, Electrodes, Soil mechanics, Soils, Costs.

To gain a better understanding of factors influencing electrical self-potential measurements as used to detect areas of seepage in an operating canal, equipmeat was developed to investigate streaming potential under laboratory-controlled conditions. Preliminary tests conducted to observe operating characteristics of the equipment and to develop test procedures indicated that: (1) The equipment as designed can be used to investigate the streaming potential-flow rate relationship. (2) Streaming potential appears to be a function of flow rate

through the soil specimen. (3) Small initial increases in flow rate were accompanied by relatively large increases in potential. (4) Measured potential was dependent upon electrode placement, with highest potential being measured when both electrodes were in contact with the specimen. Additional tests investigating physical characteristics of the equipment are recommended before conducting tests to determine streaming potential-flow rate relationship for a large number of soil types. (Author)

PB-173 448 **Field 8H**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Reclamation, Denver, Colo. Soils Engineering Branch.
SOIL MOISTURE CHANGES BENEATH A CANAL--LOWER COST CANAL LINING PROGRAM,
by D. A. Tiedemann, and C. T. Coffey. 20 Jun 66, 72p Rept. no. EM-725

Descriptors: (*Inland waterways, Leakage (Fluid)), Soils, Soil mechanics, Moisture, Costs, Fluid flow, Test equipment.

Unlined cut and embankment sections of a newly constructed canal located in loessial soil were instrumented with piezometers, and nuclear moisture probe casings were installed to determine the flow pattern, pore pressures, and degree of saturation developed below the canal prism. Tests were also conducted to correlate seepage loss as determined by well permeameter and ponding test methods. Test results were: (1) After 2 years of canal operation the degree of saturation in both sections was between 90 and 100%, with very few values of 100% recorded. (2) Points of negative pore pressure existed a short distance horizontally from the wetted canal prism. (3) The seepage patterns which developed appeared to be similar to theoretical patterns--vertical flow with very little lateral movement. (4) Comparisons were made between seepage computed from well permeameter tests and actual seepage from a ponding test. (Author)

AD-641 976 **See Field 8J**

8J. PHYSICAL OCEANOGRAPHY

AD-641 334 **Field 8J, 20A**
CFSTI Prices: HC$3.00 MF$0.50
Woods Hole Oceanographic Institution, Mass.
BOTTOM REVERBERATION IN THE NORTH ATLANTIC OCEAN AND EASTERN MEDITERRANEAN SEA.
Technical rept.,
by John K. Hall, and J. B. Hersey. Aug 66, 51p WHOI-Ref-66-47
Contract Nonr-4029 (00)
Proj. NR-260-101

Descriptors: (*Ocean bottom, Backscattering), (*Underwater sound, Backscattering), Ocean bottom topography, Acoustic impedance, Hydrophones, Extremely low frequency, Very low frequency, Underwater explosions, Atlantic Ocean, Mediterranean Sea.

Backscattering coefficients in twenty logit frequency bands between 0.1 and 10 kcps from seven explosions at six locations in the North Atlantic Ocean and Mediterranean Sea are reported. Five different physiographic provinces are represented, but environmental data are insufficient to relate scattering coefficients to the measurement locales. High fluctuation as a function of angle of incidence at frequencies below 1 kcps is interpreted as due to reflections from below the bottom while small fluctuations and occasional distinct echoes above 1 kcps are taken to be due to the topography of the sea floor. At low frequencies there is a somewhat larger dependence of the scattering coefficient on the angle of incidence than was found at higher frequencies. (Author)

AD-641 364 **Field 8J**
CFSTI Prices: HC$3.00 MF$0.75
Texas A. and M. Univ., College Station. Dept. of Oceanography.
OCEANOGRAPHY OF THE GULF OF MEXICO.
Progress rept.,
by Willis E. Pequegnat, and Leo Berner, Jr. Sep 66, 85p Ref-66-23T
Contract Nonr-2119 (04)
Projs. NR-083, 036

Descriptors: (*Mexico Gulf, *Oceanology), Marine geophysics, Sedimentation, Ocean currents, Marine meteorology, Fouling, Instrumentation.

The report gives a summary of some of the Texas A and M oceanographic research on the Gulf of Mexico which has been carried on during the past year. Included are reviews of work in physical oceanography, geophysics, geology, geo-chemistry, chemistry, instrumentation, and biofouling. Attention is called to the fact that numerous special reports have been issued by individual investigators that discuss specific research activities in greater detail. The field work carried out aboard the R/V ALAMINOS is summarized, and publications, papers, and reports resulting from the work are presented. (Author)

AD-641 742 **Field 8J**
Not available from CFSTI.
Woods Hole Oceanographic Institution, Mass.
RECENT OCEANOGRAPHIC MEASUREMENTS IN THE CARIBBEAN SEA.
Technical rept.,
by L. V. Worthington. 27 Jan 66, 12p WHOI-Ref-66-58
Contract Nonr-2196 (00)
Availability: Published in Deep-Sea Research v13 p731-9 1966.

Descriptors: (*Caribbean sea, Temperature), Oceanographic data, Oceanology, Temperature, Sea water, Salinity, Ocean bottom.

Two oceanographic sections were made across the two deepest sills of the Caribbean Sea in September 1963. One ran from the Atlantic Ocean into the Venezuelan Basin through the Anegada and Virgin Islands Passages; the second ran from the Cayman Basin into the Atlantic through the Windward Passage. These sections differ from Wust's (1963, 1964) sections in that there is no evidence that bottom water is entering the Caribbean at the present time. The Cayman Basin bottom water appears to have been warmed about 0.03C since the surveys made by Parr in 1933 and 1937. (Author)

AD-641 976 **Field 8J, 8G, 8H**
CFSTI Prices: HC$2.00 MF$0.50
Woods Hole Oceanographic Institution, Mass.
SOVIET BOOKS AND PUBLICATIONS ON GEOLOGICAL AND CHEMICAL OCEANOGRAPHY, HYDROLOGY, AND OTHER SUBJECTS ACQUIRED DURING THE SECOND INTERNATIONAL OCEANOGRAPHIC CONGRESS, MOSCOW, JUNE 1966: TITLES AND SOME TRANSLATED CONTENTS AND NOTES.
Technical rept.,
by F. T. Manheim. 2 Oct 66, 41p WHOI-Ref-66-51
TT-66-62595

Descriptors: (*Oceanology, Bibliographies), (*Marine geology, Bibliographies), (*Hydrology, Bibliographies), USSR, Maps, Russian language.

Contents: Books on oceanography; Books on hydrology (continental) and hydrogeology; Books on geology and miscellaneous topics; Atlases; Information on procuring Soviet publications.

AD-641 436 **See Field 8A**

AD-641 743 **See Field 7D**

8K. SEISMOLOGY

AD-641 366 **Field 8K**
CFSTI Prices: HC$3.00 MF$0.75
Pennsylvania State Univ., University Park. Dept. of Geology and Geophysics.
ESTIMATION OF THE DEPTH OF FOCUS OF THE MAY 10, 1963 ECUADOR EARTHQUAKE.
Special technical rept.,
by Yung-Yu Cheng. 1 Aug 66, 98p SR-6
Contracts AF 19 (628)-238, ARPA order-180-61
Proj. AF-8652
Task 865208
AFCRL-66-635
Report on Studies of the Effect of Depth of Focus on Seismic Pulses.

Descriptors: (*Seismographs, Analysis), (*Earthquakes, *Ecuador), Experimental design, Programming (Computers), Depth finding, Seismology.

The validity of a modified version of Merdler's (1964) depth-estimation procedure is tested. Criteria are developed to screen test significant answers. The criteria did not reject the correct solutions when applied to synthetic data. In testing earthquake data, 237 out of 312 significant answers were rejected by the criteria. The final output seismograms chosen for each station after visual examination were reasonably simplified for records which have a large initial amplitude, while those records beginning with a small amplitude were not reasonably simplified, in general. The average depth estimated is 13.1 km excluding the 3 extreme solutions. The depths are quite similar (plus or minus 3 km). The time difference of sP-P, PcP-P and sPcP-P may explain most of the larger estimated T's. From the consistency of the results, it appears that identification of pulses other than pP are likely. The modified procedure appears to provide a reasonable measure of the focal depth of a crustal earthquake. (Author)

AD-641 859 **Field 8K**
Not available from CFSTI.
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
THE EFFECT OF INITIAL STRESS OR RESIDUAL STRESS ON ELASTIC ENERGY CALCULATIONS.
Interim rept.,
by R. Burridge, and L. Knopoff. 29 Jul 65, 5p
Grant AF-AFOSR-710-64
Proj. AF-8652
AFOSR-66-1227
Availability: Published in Bulletin of the Seismological Society of America v56 n2 p421-4 Apr 1966.

Descriptors: (*Stresses, Energy), (*Earthquakes, Seismology), Elasticity, Functions, Strain (Mechanics).

The first aim of the paper is to define a stress-energy function which coincides with the conventional strain-energy function in a non-prestressed medium, but which has a more natural physical interpretation than strain energy for prestressed media. The second aim is to show how consideration of prestress or residual stress may drastically change theoretical energy estimates for earthquakes. (Author)

AD-641 906 **Field 8K, 17J**
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS,
by David E. Willis. 15 Sep 66, 25p VESIAC Bull-44
See also AD-629 264.

Descriptors: (*Seismology, Bibliographies), (*Nuclear explosions, Seismology), Periodi-

cals, Underground explosions, Seismic waves, Earthquakes, Structural geology, Instrumentation, Propagation, Abstracts.

Identifiers: VESIAC, VELA UNIFORM.

The bulletin contains abstracts of Semiannual, Annual, and Final Reports; Technical Notes and Journal Articles.

AD-642 002 **Field 8K, 17J**
Not available from CFSTI.
Lamont Geological Observatory, Palisades, N. Y.
EXCITATION OF SURFACE WAVES BY THE UNDERGROUND NUCLEAR EXPLOSION LONG SHOT,
by Robert C. Liebermann, Chi-Yu King, James N. Brune, and Paul W. Pomeroy. 5 May 66, 9p Contrib-933
Contracts AF 19(628)-4082, AF 49(638)-1337
Prepared in cooperation with Seismological Lab., California Inst. of Tech., Pasadena.
Availability: Published in Journal of Geophysical Research v71 n18 p4333-9 Sep 15 1966.

Descriptors: (*Nuclear explosions, Underground explosions), (*Seismic waves, Nuclear explosions), Earthquakes, Aleutian Islands, Measurement, Seismology.

The underground nuclear explosion Long Shot, detonated beneath Amchitka Island in the Aleutian Island chain on October 29, 1965, generated surface waves equivalent to those of an earthquake of surface wave magnitude M sub s = 3.9. The body wave magnitude for this event is m sub b = 6.1. Comparison with earthquakes from the same geographical and tectonic region, as well as comparison with the Ms versus m sub b relationship of Gutenberg and Richter, indicates that the surface wave generation by Long Shot was significantly less than that of earthquakes of comparable body wave magnitudes. Since the body waves from Long Shot also contain less long-period energy relative to the earthquakes, we conclude that Long Shot did not efficiently excite the long-period part of the seismic wave spectrum. The result is in agreement with previous studies of underground nuclear explosions. (Author)

N66-33522 **Field 8K**
CFSTI Prices HC$1.00 MF$0.50
Uppsala Univ. (Sweden). Seismological Inst.
SEISMIC WAVE PROPAGATION IN LAYERED MEDIA, PART I SCIENTIFIC REPORT.
by E. A. Robinson. 15 Apr 66, 14p AFCRL-66-435, AD-634914
Contract AF 61/052/-702
Its Rept.-37

Descriptors: *Laplace transform, *Seismic wave, *Wave equation, *Wave propagation, Boundary, Condition, Earth, Equation, Layer, Matrix, Model, Propagation, Seismic, Solution, Wave.

For abstract, see STAR 04 19.

AD-641 717 **See Field 17J**

N66-38296 **See Field 8G**

8L. SNOW, ICE, AND PERMAFROST

AD-641 482 **Field 8L, 14B, 13M**
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
REEVALUATION OF THE RAMMSONDE HARDNESS EQUATION.
Special rept.,
by Robert Waterhouse. Aug 66, 14p SR-100
Task 1V025001A13001
See also AD-615 997.

Descriptors: (*Snow, *Hardness), (*Equations, Hardness), Test equipment, Penetration, Hammers, Differential geometry, Tests, Kinetic theory.

Identifiers: Rammsondes.

The purpose of this report is to provide a rational derivation for a hardness term which relates the Rammsonde number to a simple but more accurate and universal energy equation. Major losses are accounted for and the use of different weights for the test can be accommodated without complicating the evaluation.

8M. SOIL MECHANICS

AD-641 311 **Field 8M, 18C**
CFSTI Prices: HC$4.00 MF$0.75
Weidlinger (Paul), New York.
CLOSE-IN EFFECTS OF NUCLEAR EXPLOSIONS. PART -II. ANALYSIS OF GROUND SHOCK FROM NUCLEAR SURFACE BURSTS ON ROCK,
by Melvin L. Baron, Charles E. Christian, and Oleg Skidan. Feb 66, 107p
Contract DA-49-146-XZ-128
Task 13.147
DASA-1388-II
See also AD-224 007.

Descriptors: (*Nuclear explosion damage, *Shock waves), (*Rock (Geology), *Explosion effects), Soil mechanics, Propagation.

This report presents a study of various phenomena which are generated in rock like media by a nuclear surface burst. Three principal regions of interest are considered: (1) an extreme close-in region in the neighborhood of Ground Zero in which the medium is represented by a hydrodynamic model; (2) a transition region in which the medium is represented by an inelastic solid material model which exhibits energy dissipation; and (3) a nearly elastic region in which inelastic energy dissipation is assumed very small and the material acts elastically. Computer codes have been developed for each of the regions. Numerical results are presented for the case of a two megaton surface burst on a tuff medium. The computed values from Region (1) are used as input parameters for the continuation of the problem into Regions (2) and (3). (Author)

AD-641 716 **Field 8M**
CFSTI Prices: HC$6.00 MF$1.25
Virginia Univ., Charlottesville. Research Labs. for the Engineering Sciences.
BIBLIOGRAPHY ON EARTH MOVEMENT,
by H. Gordon Larew, Peter M. Lovie, William R. Dodge, Jr., and William H. Rodgers. Apr 64, 230p CE-3343-108-64U
Contract DA-22-079-eng-384
Proj. DA-1-T-0-21701-A-046

Descriptors: (*Soil mechanics, Bibliographies), Geology, Avalanches, Soils, Stabilization, Motion, Roads, Foundations (Structures), Bridges, Dams.

PB-173 496 **Field 8M, 13B, 14B, 18D**
CFSTI Prices: HC$3.00 MF$0.75
Virginia Highway Research Council, Charlottesville.
CORRELATION AND CONFERENCE OF PORTABLE NUCLEAR DENSITY AND MOISTURE SYSTEMS,
by C. S. Hughes, and M. C. Anday. Jul 66, 60p SR-67-1
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Soils, Test equipment), (*Radiation measurement systems, Soils), Density, Moisture, Radioactive isotopes, Symposia, Calibration, Test equipment, Standards, Roads, Virginia.

Identifiers: Nuclear moisture-density measurement systems.

The report summarizes the 'Correlation and Conference' held in Charlottesville, Virginia, during the week of July 12, 1965. The purpose of the Correlation and Conference were to: (1) compare the results obtained by the various portable nuclear systems used to measure the densities and moisture contents of soils and aggregates; (2) attempt to reconcile any differences that might be found among the various systems; (3) give those interested in conducting research with nuclear density and moisture apparatus the opportunity of conducting auxiliary experiments under controlled field conditions. The study was generally limited to portable surface gauges; that could test in either backscatter, direct transmission, or both; however upon request from the company that manufactures a vehicular mounted nuclear system, this equipment was also included. (Author)

PB-173 497 **Field 8M, 13B**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Highway Research Lab.
SPLIT-TENSILE STRENGTH OF LIME-STABILIZED SOILS.
Civil Engineering Studies: Highway Engineering Series,
by M. R. Thompson. Jun 66, 16p Highway Engineering Ser-18
Proj. IHR-76
Prepared for presentation at the Annual Meeting of Committee on Lime and Lime-Fly Ash Stablization (44th). Highway Research Record v92 p69-82 1965. Prepared in cooperation with State of Illinois Div. of Highways, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Soils, Tensile properties), (*Pavements, Stabilization), Calcium compounds, Oxides, Soil mechanics, Test methods, Analysis of variance, Illinois.

The paper presents the principles of the split test (a diametral compression test for determining tensile strength), an evaluation of the test, and the application of the test procedure to lime-soil mixtures. Split-tensile and compressive strength test results are given for 11 soils. The results show that lime-soil mixtures develop substantial tensile strength and that the split-tensile strength is closely correlated with unconfined compressive strength. Factors such as soil type, lime treatment, and length of curing period influence the magnitude of the split-tensile and compressive strengths, but do not affect the ratio between the strengths. The investigation clearly indicates that the split test has considerable merit as a test procedure for evaluating the tensile strength properties of lime-soil mixtures. (Author)

PB-173 489 **See Field 13B**

8N. TERRESTRIAL MAGNETISM

AD-466 587 **Field 8N**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE EVEN ZONAL HARMONICS OF THE EARTH'S GRAVITATIONAL POTENTIAL.
Technical rept.,
by D. G. King-Hele, and G. E. Cook. Apr 65, 22p TR-65090

Descriptors: (*Gravity, Earth), Harmonic analysis, Potential theory, Navigation satellites, Least squares method, Orbital trajectories, Great Britain, Satellites (Artificial).

The coefficients of the even zonal harmonics in the Earth's gravitational potential are evaluated by analysing the processions of the orbital planes

of seven satellites, having orbital inclinations distributed as uniformly as possible between 28 and 96 degrees. (Author)

AD-641 350 **Field 8N, 3B**
Not available from CFSTI.
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
THREE PEAKS NEAR 27 DAYS IN A HIGH-RESOLUTION SPECTRUM OF THE INTERNATIONAL MAGNETIC CHARACTER FIGURE, Ci.
Environmental research papers, Revised ed.,
by Ralph Shapiro, and Fred Ward. 24 Jan 66, 8p
AFCRL-66-416, AFCRL-ERP-205
Proj. AF-8604
Task 860404
Revision of manuscript submitted 23 Dec 65.
Availability: Published in Journal of Geophysical Research v71 n9 p2385-8 May 1 1966.

Descriptors: (*Terrestrial magnetism, *Moon), Sunspots, Resolution, Statistical functions, Time, Series, Periodic variations.

A high-resolution power spectrum of 72 years of daily values of the international magnetic character figure, Ci, shows two subsidiary peaks on either side of the well-known 27-day period. The larger of the two subsidiary peaks is situated close to the lunar synodic period of 29.53 days. The origin of the subsidiary peaks is examined. A lunar association is rejected as a significant causal agent, along with various errors and bias. It is concluded that the subsidiary peaks represent some real phenomenon and are probably produced by solar activity, although perhaps indirectly. (Author)

N66-33708 **Field 8N**
CFSTI Prices HC$4.00 MF$1.00
Kakioka Magnetic Observatory (Japan).
GEOMAGNETISM, MEMAMBETSU 1960.
1966, 130p

Descriptors: *Geomagnetic field, *Japan, *Table, Declination, Disturbance, Field, Geomagnetic, Horizontal, Index, Intensity, Magnetic, Magnetogram, Vertical.

For abstract, see STAR 04 19.

N66-33774 **Field 8N**
CFSTI Prices HC$3.75 MF$1.50
Kakioka Magnetic Observatory (Japan).
REPORT OF THE KAKIOKA MAGNETIC OBSERVATORY, GEOELECTRICITY, KANOYA, 1957-1959.
1966, 242p REPT.-37

Descriptors: *Earth current, *Geoelectricity, *Potential gradient, Current, Data, Earth, Gradient, Japan, Observation, Potential, Table.

For abstract, see STAR 04 19.

9A. COMPONENTS

AD-456 787 **Field 9A**
CFSTI Price: HC$1.00
Microwave Electronics Corp., Palo Alto, Calif.
DEVELOPMENT OF ELECTRON GUN WITH NON-INTERCEPTING GRIDS.
Quarterly progress rept. no. 6, 28 Aug-28 Nov 64,
by Marshall McDonald, and Joseph Drees. 28 Nov 64, 24p
Contract DA 36-039-AMC-02270 (E)
Proj. DA-1P6-22001-A-055-04

Descriptors: (*Electron guns, Design), Electrodes, Electron tube parts, Cathodes (Electron tubes).

Equipotential lines for the region near the cathode of the 0.570-inch spherical radius cathode were obtained from a computer study. Electron trajectories from cathode through the anode were similarly obtained and shown to be satisfactory. A pair of aligned grids shaped to approximate the equipotential defined by the computer study were made. The shape produced was spherical with the size chosen to fit the equipotential line best out near the edge of the cathode. The two grids were separated beyond their concentric position to further improve grid wire alignment with respect to electron trajectories. This pair of grids was shown to operate as a nonintercepting grid under certain conditions when the gun in which they were installed was tested in a beam tester. Computer analysis was also applied to the gun used on a 10 kw traveling-wave tube. Electron trajectories on this 0.460-inch diameter cathode gun were comparable to those on the 1-inch diameter 0.570-inch spherical radius cathode gun. Equipotential lines near the cathode followed a spherical pattern much more closely than for the larger gun. (Author)

AD-641 306 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Dept. of Electrical Engineering.
A DISTORTION ANALYSIS OF THE MOS TRANSISTOR.
Master's thesis,
by R. F. Pfeifer, and C. T. Sah. 28 Jun 66, 28p
Contract SD-131, Grant AF-AFOSR-714-65
Proj. AF-9763
Task 976302
AFOSR-66-1340

Descriptors: (*Transistors, Distortion), Analysis, Performance (Engineering), Metals, Oxides, Semiconductors, Transistor amplifiers, Voltage.

The experimental results verify the theoretical expressions considerably well when the equations are evaluated within their respective regions of validity. The deviation from the V sub G dependance of i sub d1 which is seen to extend into the saturation region by an amount greater than the modulation width of the input signal is assumed to be due to the approximation of zero drain conductance at the edge of the saturation region. The practical results of this experiment indicate that the MOS transistor can perform satisfactorily as a low distortion amplifier when operated in the saturation mode provided that the input signal is maintained at a sufficiently low level. The properties of the square law behavior for the saturation mode can be used most advantageously in the construction of an analog squaring circuit. For this application, the test circuit of Figure 5 can be used if an additional notch filter is inserted in the output circuit to remove the fundamental frequency of the output signal. The output signal can then be conveniently measured with an rms a-c voltmeter and will vary as the square of the input signal. (Author)

AD-641 328 **Field 9A, 17I**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
DESIGN OF INTEGRATED ELECTRONIC DELAY LINE FOR A MAN-TRANSPORTABLE MTI RADAR SET.
Technical rept.,
by George A. Hrivnak. Sep 66, 23p ECOM-2759
Proj. DA-1E622001A440
Task 1E622001A440-02-12

Descriptors: (*Delay lines, *Radar equipment), Portable, Moving target indicators, Range gating, Integrated circuits, Weight.

Range gating is a process of quantizing range (time) into small intervals in Moving Target Indication Radar sets. The principal purpose of range gating is to eliminate the so-called collapsing loss effect that is inherent to delay line canceler filters. In range gating, each range gate opens in sequence just long enough to sample the video waveform corresponding to a different range interval in space. Since noise from other time intervals is excluded the collapsing loss does not take place. This report deals with the design of an electronic delay line which generates the sequential gating pulses for range-gate filters. (Author)

AD-641 338 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
CAPACITOR CHARACTERISTICS OF ANODIZED THIN-FILM HAFNIUM.
Technical rept.,
by Aubrey J. Raffalovich. Sep 66, 36p ECOM-2758
Proj. DA-1C0-24401-A-348
Task 1C0-24401-A-348-00

Descriptors: (*Capacitors, *Hafnium), Metal films, Anodic coatings, Films, Sputtering, Capacitance, Voltage, Leakage (Electrical).

Capacitors were fabricated from anodized hafnium films previously sputtered onto glass slides. The sputtering rate was 108 A/min. Anodization was accomplished at 46 volts, the electrolyte being 0.5 N. aqueous ammonium sulphate and the anodization rate 57 A/V. The counter electrode was vacuum-deposited gold. Variations in the anodic technique caused little or no improvement in capacitor characteristics. Characteristics found were: K = 50, capacitance = 1.1 microfarads/sq in, dissipation factor = 1.3%, TCC = 200 ppm/C, voltage breakdown = 75% of fermation voltage, and current leakage = 3.0 to 4.5 x 10 to the minus 8th power amps/sq in at the knee formed at 18 V. The insulation resistance at 18 V was 2.0 to 3.0 x 10 to the 10th power ohms (1.0 to 1.5 x 10 to the 8th power ohms/sq in). There are indications that the films are relatively non-polar. There is a 'wicking' of electrolyte during the anodization process.

AD-641 370 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Rome Air Development Center, Griffiss AFB, N. Y.
ULTRA WIDEBAND DIGITAL DELAY LINE.
Final rept.,
by John B. Payne, III. Sep 66, 72p RADC-TR-66-123
Proj. AF-4506
Task 450601

Descriptors: (*Delay lines, Broadband), Digital systems, Transistor amplifiers, Antenna arrays, Very high frequency, Ultrahigh frequency, Phased arrays.

The report presents the detailed technical analysis, experimental results, and problems encountered in the design and construction of a four-bit digital delay line having an instantaneous, nondispersive, and lossless bandwidth of 400 mc/s. The frequency range covered was from 50 to 450 mc/s. The signal was switched either through or around the different time delay elements. The switches consisted of wideband amplifiers which minimize amplitude and phase fluctuations across the band and between the different signal paths. Switching was performed by purely electronic means with switching time less than 50 nanoseconds. Amplitude variations up to 400 mc/s were less than 1 db with a phase error of 2 degrees. At 450 mc/s the errors were 3 db and 10 degrees, respectively. Also covered is the use of such a device for i-f time delay steering of wideband array antennas. Problems encountered in properly terminating wideband delay lines and component selection and layout are discussed. (Author)

AD-641 401 **Field 9A, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR INSULATED GATE FIELD EFFECT TRANSISTORS.

Quarterly progress rept. no. 2, 1 Mar-31 May 66,
by James K. George, Dale Reinke, Myint Hswe, and Harry Forehand. 31 May 66, 79p
Contract DA-36-039-AMC-06174 (E)
Proj. 24001
See also AD-634 828.

Descriptors: (*Transistors, Manufacturing methods), Masking, Metals, Oxides, Semiconductors, Silicon, Reliability (Electronics), Stability, Performance (Engineering), Failure (Electronics).

The work centered mainly in four areas: two new photolithographic mask sets were devised to insure the necessary geometrical variations were investigated. These new sets will enable both epitaxial and nonepitaxial techniques to be more fully developed; stable processing steps were formulated with results shown on capacitance-voltage plots; advanced devices were fabricated using information obtained from the initial production group; reliability information was compiled and certain conclusions were drawn. (Author)

AD-641 406 **Field 9A, 18H**
CFSTI Prices: HC$3.00 MF$0.75
Hughes Aircraft Co., Fullerton, Calif.
EFFECT OF TRANSISTOR DESIGN PARAMETERS ON RADIATION RESPONSE (POWER TRANSISTORS).
Rept. no. 4, 1 Jul 65-30 Jun 66 (Final),
by V. R. Honnold, G. D. Thomas, and J. J. Mazenko. Oct 66, 84p FR-66-17-267
Contract DA-28-043-AMC-01541 (E)
Task 16.0091
ECOM-01541-F
See also AD-635 218.

Descriptors: (*Transistors, *Radiation damage), Design, Transients, Silicon, Neutrons.

An investigation of design effects on the radiation resistance of a silicon planar power transistor is presented. This research was a joint theoretical and experimental study of methods to modify existing fabrication techniques to produce a power transistor which would minimize the deleterious effects of transient ionizing and displacement producing radiation. The theoretical model was developed by combining a one dimensional base transport equation with the appropriate corrections for high level injection effects. The resulting radiation design equation expresses the radiation resistance of the transistor in terms of the fundamental design parameters which were studied experimentally. The critical physical design parameters were varied in a statistically designed experiment to determine the optimum combination of processing techniques which would maximize the radiation resistance while preserving the useful electrical characteristics of the device. On the basis of these results, the optimum design parameters and processing techniques were combined to evaluate a prototype radiation resistant transistor. (Author)

AD-641 409 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Bomac Div., Varian Associates, Beverly, Mass.
PRODUCTION ENGINEERING MEASURE FOR LOW FIELD MAGNETRON BL-234C.
Quarterly progress rept. no. 5, 28 Apr-28 Jul 66,
by Arnold M. Eklund. 28 Jul 66, 31p
Contract DA-36-039-AMC-06162 (E)
See also AD-637 749.

Descriptors: (*Magnetrons, Manufacturing methods), Life expectancy, Cathodes (Electron tubes), Reliability (Electronics), Radiofrequency power, Performance (Engineering).

Life test of tube 11S has continued to 380 hours with RF operating characteristics still within specifications. Some missing pulses are discernible, but the percentage has not increased above that which was present after 130 operating hours. Peak RF power, heater power, pulse voltage, and current have also remained essentially unchanged. Tests were conducted to determine the presence, if any, of end-hat emission. Conclusions were established in the last quarterly report that end of life of tube number 121 was reached after 120 operating hours due possibly to end-hat emission, as evidenced by higher DC emission than theoretical perveance predicts. Further tests on this tube were terminated because of a previously scheduled dissection of the tube at Harry Diamond Laboratories. Tests of DC emission on several other tubes with life histories varying from 5 to 100 hours did not, however, reveal the same condition as tube number 121. Measurements were then taken of peak pulse voltage versus average anode current to observe voltage cut-off characteristics as an indicator of end-hat emission. Data taken on fresh tubes as compared with tubes that showed deteriorated performance did not establish evidence of any end-hat emission. In accordance with a request from Harry Diamond Laboratories, tube 3S, which successfully passed the shock test requirements of the BL-234C specification, was submitted to the same test with heater operating. No heater shorts or open resulted, and the tube continued to operate after completion of the test.

AD-641 410 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Microwave Associates, Inc., Burlington, Mass.
VARIABLE CAPACITANCE DIODE PRODUCTION ENGINEERING MEASURES PROGRAM.
Quarterly rept. no. 1, 27 Jun-27 Sep 66,
by Henri R. Chalifour. Sep 66, 38p
Contract DA-36-039-AMC-06181 (E)

Descriptors: (*Diodes (Semiconductor), Manufacturing methods), Capacitance, Varactor diodes, Tuning devices, Resistance (Electrical), Silicon, Performance (Engineering).

The series resistance of a tuning varactor is broken down into its components and the component resistances are analyzed in order to determine the relative magnitude of each. The result of this analysis suggests techniques which may be employed to fabricate the devices of this contract. The small area devices appear to have a close tolerance on base width and, therefore, a dimensionally exact process is implied. The tolerance on the large area diodes is not as critical and a less exact process may be used. (Author)

AD-641 411 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Silicon Transistor Corp., Garden City, N. Y.
PRODUCTION ENGINEERING MEASURE FOR 50-AMPERE SILICON POWER TRANSISTORS.
Quarterly progress rept. no. 1, 27 May-26 Aug 66,
by A. Licata, and A. Palmerini. 26 Aug 66, 48p
Contract DA-36-039-AMC-06185 (E)

Descriptors: (*Transistors, Manufacturing methods), Silicon, Soldered joints, Molybdenum, Failure (Electronics), Pellets.

Significant progress was made in the process improvement work. A molybdenum disk was introduced in the solder joint. Test data shows that the failure mode due to silicon pellet cracking was eliminated. Two new pellet designs were used and some devices with the new pellets were evaluated. It was found that the round pellet resulted in satisfactory pellet yield and device yield. (Author)

AD-641 456 **Field 9A, 20L**
CFSTI Prices: HC$3.00 MF$0.50
General Electric Co., Schenectady, N. Y. Research and Development Center.
NEW SOLID-STATE DEVICE CONCEPTS,
by M. Aven, W. Garwacki, R. B. Hall, J. R. Richardson, and H. H. Woodbury. Sep 66, 51p
Scientific-6
Contract AF 19 (628)-4976
Proj. AF-4608
Task 460805
AFCRL-66-657

Descriptors: (*Semiconductor devices, Solid state physics), Electroluminescence, Semiconductors, Cadmium alloys, Cadmium compounds, Selenium alloys, Sulfides, Zinc alloys, Silicon, Masking, Diffusion, Solubility, Photoconductivity, Oxidation, Semiconducting films, Diodes (Semiconductor), Oxides.

The diffusion of Se in CdSe is found to be similar to that in CdS. Na diffuses rapidly in CdS, indicating an interstitial diffusion mechanism. Enhanced Na solubility in donor-doped material indicates, in addition, a substitutional form. In Cl-doped CdS it forms a rather stable NaCl complex 'molecule.' A method of measuring the diffusion profile of Cl using radioactive Na is indicated. Measurements show considerable overlap between the photoconductivity excitation bands in p- and n-type ZnSe (x)Te (1-x) and the electroluminescent emission band of the diodes, thus confirming the turn-on mechanism postulated earlier. Reduction of the contact resistance to the p-type side of the ZnSe (x)Te (1-x) diodes has made it possible to turn them on at 77K without an external light pulse. The electrochemical phenomena taking place during the oxidation of silicon are discussed. With thin-film GaAs diodes prepared under more carefully controlled evaporation conditions, it has been found that only films deposited on substrates between 350 and 450C have optical properties approaching those of bulk GaAs. An automatic mask changer and series of evaporation masks have been completed. (Author)

AD-641 563 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Rome Air Development Center, Griffis AFB, N. Y.
METALLIZATION FAILURES IN SEMICONDUCTOR DEVICES,
by Joseph M. Schramp. Oct 66, 8p RADC-SP-66-7
Presented at American Institute of Aeronautics and Astronautics, 18 July 1966, New York City, New York.

Descriptors: (*Semiconductor devices, *Failure (Electronics)), Surface properties, Films, Metal films, Semiconductors, Oxides, Circuit interconnections, Electric connectors, Reliability (Electronics), Heat of activation, Reaction kinetics.

By monitoring the resistance of thin film structures, information concerning the activation energy and reaction kinetics of solid state reaction occurring in metal systems was obtained in relatively short times. By permitting sensitive measurements to be made at relatively low stress conditions, the potential hazard of extrapolating high stress data is avoided. Metal-metal, metal-semiconductor, and metal-oxide systems were studied at temperatures ranging from 150C up to 20C below the solidus temperature of some of the systems. Data were obtained on interactions in various ohmic contact systems, including Au- (Sn-Sb), Ag-Sn, Au-Cr, Au- (Ni-Cr), Al-Si and Al-SiO2. (Author)

AD-641 606 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
CTS Knights, Inc., Sandwich, Ill.
PRODUCTION ENGINEERING MEASURES. VHF QUARTZ CRYSTAL UNITS CR- (XM-38)/U 150 MC TO 200 MC.
Quarterly rept. no. 11, 1 Jan-30 Mar 66.
30 Mar 66, 31p
Contract DA-36-039-sc-85973
See also AD-622 561.

Descriptors: (*Quartz resonators, Manufacturing methods), Very high frequency, Aging (Materials), Test equipment, Measurement.

Problems encountered in measuring the aging of 9th overtone units (150 mc to 200 mc) on their

third overtones are discussed, with samples of data showing frequency variations resulting from the instability of the oven-oscillator testing equipment. (Author)

AD-641 613 **Field 9A, 13H**
CFSTI Prices: HC$3.00 MF$0.50
Texas Instruments Inc., Dallas. Semiconductor-Components Div.
THIN FILMS FORMED BY ELECTROCHEMICAL REACTIONS.
Final rept. no. 10, 1 Jun 63-31 May 66,
by Michael J. F. Gaze. Oct 66, 54p 03-66-98
Contract DA-36-039-AMC-02324 (E)
Proj. DA-1CO-24401-A112
Task 04
ECOM-02324-F
See also AD-635 386.

Descriptors: (*Films, *Sputtering), (*Resistors, Tantalum), Tantalum compounds, Oxides, Dielectric films, Doping, Preparation.

Identifiers: Tantalum oxide.

Resistors formed by reactively sputtered tantalum in oxygen have been produced with a practical upper sheet resistance limit of 300 ohms/sq in. The temperature coefficient of the oxygen doped tantalum resistors is generally less than 150 ppm/C. The temperature coefficient can be reduced by gold doping the tantalum-tantalum oxide mixture. Tantalum oxide dielectrics have been deposited by reactive sputtering in oxygen. The dielectric constant is 21, dielectric strength 0.025 V/A and dissipation factor from 1 to 2%. The practical upper limit on capacitance per unit area is 0.35 pF/sq mil or 0.35 microfarads/sq in. It has been found that the addition of low resistivity semi-conducting MnO2 to the capacitor structure greatly increases the free-from-shorts-yield. The causes of instability in the deposited resistors has been investigated and the faults corrected by a specially designed sputtering unit. The resistor and capacitor development was accomplished using silicon as the substrate material. This simulates combining the resistor and capacitor with diffused silicon devices to form hybrid structures. (Author)

AD-641 614 **Field 9A, 20L**
CFSTI Prices: HC$3.00 MF$0.75
Hewlett-Packard Labs., Palo Alto, Calif.
INVESTIGATION AND DEVELOPMENT OF SEMICONDUCTOR-METAL CATHODES.
Interim rept.,
by Lawrence S. Lerner, and Robert J. Archer.
Aug 66, 68p Scientific-1
Contract AF 19 (628)-5946
Proj. AF-4608
Task 460805
AFCRL-66-479

Descriptors: (*Cathodes, Semiconductors), Band theory of solids, Dielectric films, Gallium alloys, Arsenic alloys, Doping, Metal films.

With a view to the development of a semiconductor-metal cathode, investigations have been undertaken aimed at the production of Schottky barriers of height ms > or = 1.5 eV on semiconductor materials of controllable properties. A brief survey has been made of the characteristics of Schottky barriers on ZnO and B6P, and an intensive study of the GaAs (1-x)Px system has been begun. It has been established that etching with H2SO4-H2O-H2O2 (etch a0 prior to vacuum deposition of gold or aluminum dots results in barriers of consistent properties, and correlation with direct ellipsometric measurements of surface film thickness has been made. The etch A treatment reduces the film thickness from nearly equal to 30 A (after careful solvent cleaning) to nearly equal to 12 A, or close to the best values obtained to date on Si. Barrier heights up to approximately 1.3 eV have been obtained to date on etched GaAs (.60)P (.40). In an attempt to understand in detail the discrepancies between the barrier heights measured by means of capacitance vs voltage, current vs voltage, and photoemissive yield measurements, and to take possible experimental evaluation of true barrier height, a theoretical treatment of Schottky barriers is presented which includes explicitly the effects of the interfacial dielectric film. (Author)

AD-641 858 **Field 9A, 14D**
CFSTI Prices: HC$4.00 MF$0.75
IIT Research Inst., Chicago, Ill.
FAILURE MECHANISMS IN RESISTORS.
Final rept. 3 Feb 65-3 Jan 66,
by F. R. Hand, M. Goldberg, and W. Brennan.
Oct 66, 106p E-6042-14
Contract AF 30 (602)-3614
Proj. AF-5519
Task 551906
RADC-TR-66-495

Descriptors: (*Resistors, *Failure (Electronics)), Reliability (Electronics), Metal films, Films, Nickel alloys, Chromium alloys, Aging (Materials), Experimental data.

The accomplishments in the study of the failure mechanisms in metal thin film resistors is presented. The films studied were of the same type employed by several of the major manufacturers of thin film resistive networks. Experiments were carried out to identify the principal physical mechanisms contributing to the degradation of these devices. Chief among these were homogenization of the film composition, stress relief, and ion migration. A computer analysis of manufacturers test data was carried out to determine the nature of the behavior function. The computer was also used to derive from experimental data, an empirical expression for the test resistors as a function of environment, deposition parameters, and time. As a part of this program, the Fourth Annual Physics of Failure in Electronics Symposium was conducted. An evaluation of the symposium is presented. (Author)

AD-641 877 **Field 9A, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Delco Radio, Div., General Motors Corp., Kokomo, Ind.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE SCL7004/21 AND SCL7004/22 TRANSISTORS.
Quarterly progress rept. no. 3, 1 Jun-31 Aug 66,
by R. P. Anjard. 31 Aug 66, 81p
Contract DA-36-039-AMC-06170 (E)
See also AD-636 921.

Descriptors: (*Transistors, Quality control), Reliability (Electronics), Manufacturing methods, Failure (Electronics), Processing.

Progress is reported on a program to improve the processes used to manufacture the 2N2210 and 2N297A transistors, particularly to reduce field failures of the AN/VRC 12. The program plan includes equipment and process modifications, a reliability test program and a failure analysis supplementary program.

AD-641 919 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Eaton Electronics Research Lab., McGill Univ., Montreal (Quebec).
A CRYOGENIC MAGNET SYSTEM FOR QUASI-CONTINUOUS OPERATION.
Technical rept.,
by Richard Stevenson, and Peter Marston. Oct 66, 11p TR-8
Contract Nonr-3013 (00)
See also AD-641 920.

Descriptors: (*Magnets, Cryogenics), Magnetic fields, Solenoids, Aluminum, Stresses, Coolants, Helium.

The general layout and design of a relatively inexpensive system to produce magnetic fields in the 200 and 300 koer region is described. The magnets are solenoids wound from high purity aluminum in a regionalized, stress-reduced configuration. Detailed stress analysis indicates that the solenoids can be built so that the stress in the conductor need not rise above the yield strength of the aluminum. A typical mechanical configuration of a solenoid is described. The coils are cooled by compressed helium gas at about 17K. The nature of the cooling load determines the mode of operation of the magnets, and the size of the associated cryogenic equipment. (Author)

AD-641 920 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Eaton Electronics Research Lab., McGill Univ., Montreal (Quebec).
A 100 KILOGAUSS QUASI-CONTINUOUS CRYOGENIC SOLENOID. PART I.
Technical rept.,
by Peter Marston, and Laszlo Lontai. 19 Oct 66, 13p TR-9
Contract Nonr-3013 (00)
Proj. NR-018-503
See also AD-641 919.

Descriptors: (*Solenoids, Stresses), (*Magnets, Cryogenics), Magnetic fields, Winding.

A stress analysis is made of a solenoid intended for high field service at low temperatures. It is shown that a reduction in the stress level can be achieved by a mechanical regionalization of the windings. (Author)

AD-641 943 **Field 9A, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
INTEGRATED CIRCUITS FOR FIELD DATA COMPUTERS.
Quarterly rept. no. 2, 1 Nov 65-30 Jan 66,
by Ury Davidsohn, and Faith Lee. Nov 66, 17p
Contract DA-28-043-AMC-01630 (E)
Proj. DA-1E622001A440
Task 1E622001A44002
ECOM-01630-2
See also AD-631 027.

Descriptors: (*Integrated circuits, *Computers), Semiconductor devices, Configuration, Diffusion, Digital systems, Computer logic, Transistors, Gates (Circuits), Silicon compounds, Dioxides, Oxides, Glass.

This report outlines the type of circuit that has been decided upon and delineates the device geometries which will be used. Diffusion profiles are discussed, and the adaptation of the EPIC process to this particular circuit configuration is detailed. (Author)

AD-641 980 **Field 9A**
CFSTI Prices: HC$3.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
TUBE CIRCUIT DESIGN USING THE 'G' CURVE TECHNIQUE.
Memorandum rept.,
by Keats A. Pullen, Jr. Apr 49, 34p BRL-MR-489
Proj. TB3-0538A

Descriptors: (*Electron tubes, *Circuits), Design, Graphics, Amplifiers, Oscillators, Electrical conductance, Nomographs.

The report presents the fundamental physical relations at the current stream within a tube and their relations to the external circuit. The simple amplifier formula is derived in this section. The techniques of use of the simple equation are discussed. The suggested method of presentation of tube characteristic curves to permit exact evaluation of tube voltage amplification at specific points is presented. This consists of inclusion of contours of constant transconductance and constant plate

conductance. It is shown that use of the appropriate load line in conjunction with the mentioned curves permits evaluation of voltage amplification on a point-by-point basis. From this information distortion can be evaluated directly. In addition design techniques having particular application to design of oscillators are discussed. Determination of output amplitude and also the shift of frequency from an assumed approximate frequency is possible by techniques explained. A resume is presented of a large variety of types of circuits which can be studied in this manner. The equations found most useful in performing designs are included as well as some details on their use. Oscillator applications are given special attention since complete design of circuits in this field are relatively little discussed in the current literature and the textbooks. In addition, a set of nomographs is explained in Section D, which can be used to simplify routine calculations and consequently aid the user. (Author)

AD-641 981 **Field 9A**
CFSTI Prices: HC$1.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE USE OF CONDUCTANCE CURVES FOR PENTODE CIRCUIT DESIGN.
Memorandum rept.,
by A. H. Hodge, and K. A. Pullen. Nov 49, 20p
BRL-MR-499
Proj. TB3-0538A

Descriptors: (*Pentodes, *Circuits), Design, Electrical conductance, Graphics.

It is shown that a revised form of characteristics curves for pentode tubes offers a convenient method of circuit design. Contrary to the usual curves, this design may be carried out at any desired screen voltage, and small signal voltage amplification may be computed at the various bias values. A typical set of these curves is shown. A brief discussion of the transconductance (G curve) method of solution of circuits as applied to triodes is included, along with a statement of the most useful equations. Sources for equations for more complex circuits are listed. Typical design methods are indicated to show the usefulness of the technique. Techniques of choice of operating conditions with the use of the new curves, and methods of making first order corrections are indicated. The mode of attack in the design of a pentode oscillator to get desired operating characteristics is also indicated. A list of some of the circuit types which have been analyzed by this method is included. (Author)

AD-641 985 **Field 9A, 9E**
CFSTI Prices: HC$2.00 MF$0.50
Naval Research Lab., Washington, D. C.
USING A PARALLEL-T NETWORK FOR DEVELOPING QUADRATURE VOLTAGES AT VARIABLE FREQUENCIES.
Interim rept.,
by S. O. Bailey. 30 Aug 66, 30p NRL-6440
Proj. SF-013-01-14-11630.201

Descriptors: (*Phase control devices, *Networks), Discriminators, Cathode followers, Phase shift, Frequency, Amplifiers, Oscillators, Circuits, Voltage, Phase detectors.

Two voltages phased in quadrature are developed at special junctions in a twin-T or parallel-T resistance-capacitance network. Heretofore, this network has been utilized for only its null transmission characteristics. Utilization of these properties remain essential when considering some complete circuits. The two voltages are produced with phase relation that is not sensitive to changes of the driving frequency; however, the amplitude ratio of the two voltages is related to the null frequency. A variable frequency oscillator which generates two voltages phased in quadrature can be constructed using a symmetric parallel-T network. The operating frequency may be manually selected in somewhat the same manner as presently done with conventional Wien-bridge oscillators. This oscillator may be converted into a generator of voltages with arbitrary phase relations which may be simply controlled. By making connections to all junctions of the parallel-T network it is possible to construct frequency-selective amplifiers which operate through narrow bandwidths and produce well-filtered quadrature voltages. These voltages should be useful for producing undistorted circular time traces on oscilloscopes. With connections to all junctions in a parallel-T network it is possible to construct frequency discriminators with output voltages that vary in a predictable manner as the input frequency varies through a maximum-to-minimum ratio of four to one. The bandwidth together with the upper and lower limit of the output voltage can be altered by incorporating a frequency-selective amplifier as a part of the frequency discriminator. (Author)

N66-32716 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
Westinghouse Electric Corp., Baltimore, Md. Electronics Div.
A SURVEY OF ADAPTIVE COMPONENTS FOR USE IN FAILURE-FREE SYSTEMS SPECIAL TECHNICAL REPORT NO. 1.
Aug 63, 18p NASA-CR-55039
Contract NASW-572

Descriptors: *Component reliability, *Electrochemical cell, *Integrator, *System failure, Adaptation, Analog, Cell, Circuit, Component, Core, Degradation, Electrochemical, Electrolyte, Failure, Harmonic, Logic, Magnetostriction, Memory, Mercury, Reliability, Solion, Stability, System, Voting.

For abstract, see STAR 04 19.

N66-32756 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
Texas Instruments, Inc., Dallas. Semiconductor-components Div.
DESIGN, DEVELOPMENT AND DELIVERY OF ONE (1) BREADBOARD AND THREE (3) PRODUCTION UNITS OF A 75 VA INTEGRATED STATIC INVERTER MONTHLY PROGRESS REPORT NO. 11, MAR. 1966.
by L. L. Glover, L. A. Hahn, P. F. Newcomb, and J. P. Vergez. Mar 66, 23p NASA-CR-76899
Contract NAS8-11925
Its Rept.-03-66-37

Descriptors: *Product development, *Static inverter, Array, Breadboard, Capacitor, Compound, Design, Development, Inductor, Inverter, Model, Potting, Power, Product, Progress, Report, Static, Transistor.

For abstract, see STAR 04 19.

N66-32763 **Field 9A**
CFSTI Prices HC$2.00 MF$0.50
General Precision, Inc., Glendale, Calif. Librascope Group.
STUDY OF FAILURE AND RELIABILITY IN MICROELECTRONIC DEVICES THIRD QUARTERLY REPORT.
May 66, 40p NASA-CR-76883, TR-2-0426
Contract NAS12-72

Descriptors: *Failure mode, *Fatigue, *Microminiaturized electronic equipment, *Thermal cycling, Analysis, Cycling, Device, Electronics, Elevon, Equipment, Failure, Life, Microelectronics, Microminiaturization, Mode, Reliability, Stress, Subjection, Temperature, Test, Thermal.

For abstract, see STAR 04 19.

N66-32765 **Field 9A**
CFSTI Priees HC$2.00 MF$0.50
General Precision, Inc., Glendale, Calif. Librascope Group.
STUDY OF FAILURE AND RELIABILITY IN MICROELECTRONICS DEVICES SECOND QUARTERLY REPORT.
Feb 66, 26p NASA-CR-76882
Contract NAS12-72
Its Rept.-2-0418

Descriptors: *Failure mode, *Fatigue, *Microminiaturized electronic equipment, *Thermal cycling, Analysis, Cycling, Device, Electronics, Equipment, Failure, Life, Microelectronics, Microminiaturization, Mode, Reliability, Stress, Subjection, Temperature, Test, Thermal.

For abstract, see STAR 04 19.

N66-33170 **Field 9A**
CFSTI Prices HC$4.00 MF$0.75
Texas Univ., Austin. Electronic Materials Research Lab.
MICROELECTRONICS RESEARCH ON SILICON-SILICON OXIDE STRUCTURES AND INTERFACES QUARTERLY REPORT NO. 2, 1 SEP. - 30 NOV. 1964.
30 Nov 64, 112p NASA-CR-57826
Contract NAS8-11235

Descriptors: *Metal oxide semiconductor (mos), *Microelectronics, *Semiconductor device, *Silicon, Analysis, Capacitance, Device, Electron, Fluorescence, Furnace, Interface, Measurement, Metal, Microscopy, Oxide, Photoresistor, Semiconductor, Structure.

For abstract, see STAR 04 19.

N66-33179 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
Massachusetts Inst. Of Tech., Cambridge. Dept. Of Electrical Engineering.
ANALOG CIRCUIT FOR DETERMINING THE RATIO AND PRODUCT OF TWO TIME FUNCTIONS.
by D. H. Steinbrecher. 1964, 4p NASA-CR-60083
Contract DA-36-039-AMC-03200/E/, Grant NSG-419
Presented At The Intern. Solid State Circuits Conf., Univ. Of Pa., Philadelphia, 17-19 Feb. 1965

Descriptors: *Circuit, *Noise meter, *Rc network, *Time function, Analog, Figure, Function, Meter, Noise, Product, Ratiometer, Time, Two, Varactor.

For abstract, see STAR 04 19.

N66-33370 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
A UNIQUE VARIABLE WIDTH PULSE INTEGRATOR.
by A. L. Newcomb Jr. 1964, 10p NASA-TM-X-54847
Submitted For Publication

Descriptors: *Infrared scanner, *Integrated circuit, *Pulse width amplitude converter, *Spacecraft sensor, Amplitude, Circuit, Converter, Horizon, Infrared, Integration, Mechanism, Pulse, Scanner, Sensor, Servo, Spacecraft, Variable, Width.

For abstract, see STAR 04 19.

N66-33390 **Field 9A**
CFSTI Prices HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
ELECTRONIC PACKAGING - A BIBLIOGRAPHY.
by J. L. Easterday, J. C. Holt, J. W. Klapheke, and W. H. Veazie. 31 Mar 66, 95p NASA-CR-76570, RSIC-534

Contract DA-01-021-AMC-11706/Z/
Center, 31 Mar. 1966 95 P Refs Prepared For Nasa

Descriptors: *Bibliography, *Electronic packaging, *Microcircuit, Annotation, Circuit, Component, Design, Electronic, Equipment, Interconnection, Literature, Packaging, Technique.

For abstract, see STAR 04 19.

N66-33421 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TANGENTIAL SENSITIVITY OF TUNNEL DIODE VIDEO DETECTORS.
by W. F. Gabriel. 17 Nov 64, 14p NASA-TM-X-54862
Presented At The 1965 G-mtt Symp., Ieee, Clearwater, Fla., 5-7 May 1965 Submitted For Publication

Descriptors: *Sensitivity, *Signal detector, *Tunnel diode, Amplification, Bandwidth, Detector, Diode, Frequency, Negative, Performance, Radio, Region, Resistance, Signal, Tangent, Tunnel, Video.

For abstract, see STAR 04 19.

N66-33435 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
Westinghouse Electric Corp., Baltimore, Md. Surface Div.
RESEARCH ON FAILURE FREE SYSTEMS QUARTERLY REPORT NO. 8, MAR. 23 - JUN. 23, 1966.
1966, 12p NASA-CR-77054, WGD-38531
Contract NASW-572

Descriptors: *Computer program, *Electronic equipment, *Redundant system, *Reliability, Allocation, Analysis, Block, Computer, Documentation, Electronic, Equipment, Estimation, Failure, Free, Point, Program, Simulation, System, Test.

For abstract, see STAR 04 19.

N66-33505 **Field 9A**
CFSTI Prices HC$2.50 MF$0.75
General Electric Co., Cincinnati, Ohio. Space Power And Propulsion Section.
DEVELOPMENT OF ELECTRICAL SWITCHGEAR FOR SPACE NUCLEAR ELECTRICAL SYSTEMS QUARTERLY PROGRESS REPORT NO. 6, MAR. 4 - JUN. 4, 1966.
by A. H. Powell. 1966, 78p NASA-CR-72014
Contract NAS3-6467

Descriptors: *Electric network, *Switch, Ceramic, Electric, Endurance, Ion, Network, Nuclear, Pump, Seal, Space, System, Test, Vacuum.

For abstract, see STAR 04 19.

N66-33967 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOW POWER NANOSECOND PULSE AND LOGIC CIRCUITS USING TUNNEL DIODES.
by C. A. Cancro, N. M. Garrahan, and S. Paull. Aug 66, 20p NASA-TN-D-3558

Descriptors: *Logic circuit, *Nanosecond, *Threshold detector, *Tunnel diode, Circuit, Combination, Configuration, Detector, Development, Diode, Double, Functional, Logic, Low power, Microcircuit, Package, Pulse, Single, Threshold, Tunnel.

For abstract, see STAR 04 19.

N66-37676 **Field 9A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
DAMAGE TO FIELD-EFFECT TRANSISTORS UNDER 22 AND 128 ME V PROTON BOMBARDMENTS.
by F. R. Bryant, and C. L. Fales. Oct 66, 45p NASA-TN-D-3630
Contract 124-09-01-16-23

Descriptors: *Field effect transistor (fet), *Proton irradiation, *Radiation effect, Bombardment, Conductance, Current, Damage, Drainage, Electric, Gate, Germanium, Leakage, Property, Proton, Radiation, Resistance, Silicon, Voltage.

For abstract, see STAR 04 23.

N66-38275 **Field 9A**
CFSTI Prices HC$1.00 MF$0.50
Delaware Univ., Newark. Dept. Of Physics.
MULTILAYER OHMIC CONTACTS ON CDS.
by K. W. Boer, and R. B. Hall. 18 Jul 66, 22p TR-10, AD-636420
Contract NONR/G/-4336/00/
Sponsored In Part By Nasa

Descriptors: *Cadmium sulfide, *Electric contact, *Evaporation, Circuit, Device, Electric, Electrode, Multilayer, Plating, Property, Semiconductor, Terminal, Vapor.

For abstract, see STAR 04 23.

N66-38753 **Field 9A**
CFSTI Prices HC$2.00 MF$0.50
Little (Arthur D.), Inc., Cambridge, Mass.
FEASIBILITY STUDY OF THIN FILM TUNNEL CATHODES.
by J. Shao, and D. L. Sullivan. Jul 65, 34p NASA-CR-66203, C-67092
Contract NAS1-4776

Descriptors: *Thin film, *Tunnel cathode, *Ultrahigh vacuum, *Vacuum gauge, Cathode, Cold, Deterioration, Emission, Film, Gauge, Performance, Thin, Tunnel, Ultrahigh, Vacuum.

For abstract, see STAR 04 23.

PB-173 247 **Field 9A, 13J**
CFSTI Prices: HC$3.00 MF$0.75
STUDY OF LARGE ELECTRICAL BUS BARS IN PROTECTED DUCTS FOR AN ADVANCED SHIP,
by A. J. Stromsted, H. D. Morse, P. J. Carlaftes, and J. P. Fitzgerald. Nov 64, 52p
Contract MA-3307
Prepared in cooperation with Maritime Administration, Dept. of Commerce, Washington, D. C.

Descriptors: (*Electric connectors, Ducts), (*Ships, Electrical equipment), Power supplies, Distribution, Costs, Electric cables.

Identifiers: Bus bars.

The report outlines economic and other gains of an industrial bus duct system as a ship's electrical power distribution network and the special problems in a marine application. The study includes factors that influence utilizing a bus duct distribution system for ships, including electrical or structural problem areas and means of protection against injury. Consideration is given to the ships structure and providing physical protection of bus ducts. Watertight deck and bulkhead penetrations are discussed and illustrated. Extent of modification of standard electrical equipment for a bus duct type distribution system is considered. Several concepts of distribution methods are discussed and illustrated, according to degree of flexibility, selectivity and service continuity desired. Consideration is given to relative costs of each type of system, to the type of ship to which it is applied and to the severity of duty the system must accommodate with a minimum of service interruption. The study indicates that bus duct type distribution systems provide reduction of wireway runs, reduction of penetrations and identification markings, reduction in variety of cable sizes, improved maintenance and cleanliness conditions, reduced wiring problems in conversions, emergency conditions or new additions to the electrical installation; reduction in cost of certain systems and shortening of installation time as compared to conventional wiring modes. (Author)

AD-641 304 **See Field 10B**

AD-641 468 **See Field 9E**

AD-641 498 **See Field 20L**

AD-641 673 **See Field 9E**

AD-641 713 **See Field 9E**

PB-173 175 **See Field 9E**

PB-173 482 **See Field 9E**

PB-173 503 **See Field 9C**

9B. COMPUTERS

AD-252 910 **Field 9B, 5A**
CFSTI Price: HC$3.60
RAND Corp., Santa Monica, Calif.
THE ROLE OF DATA INPUT IN AUTOMATIC DATA PROCESSING SYSTEMS.
Research memo.,
by Solomon L. Pollack. 9 Dec 60, 40p RM-2681
Contract AF 49 (638)-700

Descriptors: (*Data processing systems, Input-output devices), Data transmission systems, Digital computers, Management engineering, Programming (Computers).

This study is primarily concerned with data input which is defined as the generation, collection, and transmittal of data to be entered into a computer for automatic processing. The study describes the several stages of data input, a few problem areas, and some of the techniques and recent equipment development useful for solving them. Certain basic principles that can be used as a basis for improving data input are: (1) data-input specialists should be employed more widely; (2) input error prevention, detection, and correction routines should be incorporated in data systems; (3) data input problems should be considered when an electronic data processing system is designed; and (4) the Air Force should plan, at this time, for the role that data input will play in automatic data processing systems in the 1965 to 1975 time period. (Author)

AD-422-112 **Field 9B, 5B**
CFSTI Price: HC$1.10
System Development Corp., Santa Monica, Calif.
CONVERT OLD OR NEW FORMAT PATCH TAPE TO SPLICE TAPE FORMAT (MATCH).
Technical memo.,
by J. G. Hillhouse. 18 Sep 63, 10p TM-705/040/01
Contract AF 19 (628)-1648

Descriptors: (*Systems engineering, Computers), (*Programming (Computers), Documentation), Input-output devices, Operation, Punched cards, Punched tape.

AD-455 745 **Field 9B**
CFSTI Price: HC$3.00
Stanford Electronics Labs., Stanford Univ., Calif.
CONVERGENT AUTOMATIC-SYNTHESIS PROCEDURES FOR SAMPLED-DATA NETWORKS WITH FEEDBACK.

Technical rept.,
by Patrick E. Mantey. Oct 64, 73p SU-SEL-64-112, TR-6773-1
Contract DA-04-200-AMC-57 (Z)

Descriptors: (*Data processing systems, Networks), Design, Computer logic, Iterative methods, Sequences, Linear systems, Integral transforms, Errors, Least squares method, Adaptive control systems, Matrix algebra, Polynomials, Integral equations, Difference equations, Series.

The purpose of the research described herein was to develop convergent automatic-synthesis procedures for sampled-data networks with feedback, when the input and desired response sequences for the network are given and the network is of a fixed order. The capability of iterative synthesis using performance feedback has been obtained. The conventional sum-squared-error performance criterion was found to result in error surfaces with multiple minima when applied to the synthesis of linear sampled-data networks with feedback. A modified quadratic error criterion was developed, consisting of the sum of the squares of the difference between the desired output of the network and the actual network output during synthesis, with the modification that the desired output, rather than the network output, was fed back. Minimization of this criterion is shown to converge to a unique solution. For the order of network chosen, if a solution exists that can yield exactly the desired response for the given input sequence. It is shown that minimization of the modified performance criterion will achieve this solution. (Author)

AD-641 346 **Field 9B**
CFSTI Prices: HC$9.60 MF$0.75
Ballistic Research Labs., Aberdeen Proving Ground, Md.
PROGRAMMING PRINCIPLES FOR THE IBM RELAY CALCULATORS,
by J. Lynch, and C. E. Johnson. Oct 49, 95p
BRL-705

Descriptors: (*Programming (Computers), *Digital computers), Programmers, Computer operators, Control sequences.

The report covers the principles of programming and operation of IBM Relay Calculators, which are general purpose, automatic, sequence-controlled digital calculators. The report is intended principally for the assistance of personnel engaged in programming and operation, but is expected to be valuable to those intending to submit computational problems for solution. (Author)

AD-641 541 **Field 9B, 12A**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Mathematics.
NETS OF THRESHOLD ELEMENTS,
by Kenneth Krohn, and John Rhodes. 4 Jun 64, 13p
Contract Nonr-4138 (00), Grant AF-AFOSR-848-65
Proj. AF-9749
Task 974901
AFOSR-66-1222
Availability: Published in Information and Control v8 n6 p579-88 Dec 1965.

Descriptors: (*Special functions (Mathematical), *Computer logic), Set theory, Algebras, Information theory.

Identifiers: Threshold functions.

The authors obtain several theoretical results concerning properties of the transition function given by a finite net of threshold elements. In particular, they are able to give an exact characterization of these transition functions solely in terms of the Boolean Ring. Specializing this result we find necessary and sufficient conditions that a Boolea function is realizable by a single threshold element. Also they furnish axioms for the transition functions of McCulloch-Pitts Nets, etc. (Author)

AD-641 647 **Field 9B, 6D**
CFSTI Prices: HC$3.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
GRAPHICAL-DATA-PROCESSING RESEARCH STUDY AND EXPERIMENTAL INVESTIGATION.
Quarterly rept. no. 2, 1 May-31 Jul 66,
by R. O. Duda, and J. H. Munson. Aug 66, 55p
Rept. no. 24
Contract DA-28-043-AMC-01901 (E)
Proj. DA-1P6.20501.A448.02.45
ECOM-01901-24
See also AD-637 022.

Descriptors: (*Graphics, Data processing systems), (*Character recognition, Graphics), (*Learning machines, Character recognition), Pattern recognition, Analog-digital computers, Adaptive systems.

The report describes work in progress in each of the stages of the analysis of graphical data (specifically, the recognition of hand-printed FORTRAN test). These stages are: data preparation; input of data to the analysis system; preprocessing; classification; and contextual analysis. A preprocessing and classification method adapted from Jon K. Clemens of MIT was programmed and tested on characters from the data base. The best results were obtained for alphabetic characters only: 58% correct, 23% errors, and 19% rejects. The beginnings of work, directed at improving the recognition rate through the use of contextual relations among individually classified characters, are described. A small study showing that the recognition rate by humans of characters without context is on the order of 99%, and that the quantization performed during input to the system reduces this rate only slightly. (Author)

AD-641 672 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
SYNTHESIS OF AUTOMATA BY DECOMPOSITION TECHNIQUES.
Final rept., Mar 65-Sep 66,
by Clarence M. Ablow, and Michael Yoeli. Sep 66, 19p
Contract AF 19 (628)-5092
Projs. AF-4641, SRI-5460
Task 464101
AFCRL-66-673

Descriptors: (*Automata, Synthesis), (*Mathematical logic, Automata), Graphics, Artificial intelligence, Algebras, Quadratic programming.

Identifiers: Decomposition theorem, Sequential machines.

The major effort under this research program was devoted to parallel decompositions of single-input automata (autonomous sequential machines) without and with state-splitting. First, decompositions into two smaller automata subject to suitable optimality criteria were considered and computational decomposition techniques were established. Next, indecomposable single-input automata (modules) were characterized and methods were derived for the realization of any specified single-input automaton as parallel composition of such modules. Some results concerning cascade decompositions of single-input automata are also given. The other part of this research program was devoted to establishing a mathematically precise, basic theory for generalized cascade decompositions of partially specified multi-input semi-automata (output-free sequential machines). Earlier work by Yoeli was unified with recent work on complete automata by Zeiger. The concept of homomorphic relation plays an important role in this connection. (Author)

AD-641 745 **Field 9B, 5B**
CFSTI Prices: HC$1.00 MF$0.50
Northwestern Univ., Evanston, Ill. Information-Processing and Control Systems Lab.
GENERATION OF AN OUTPUT REGULAR EXPRESSION OF A SEQUENTIAL MACHINE WITH A SPECIFIED INPUT REGULAR EXPRESSION.
Technical rept.,
by S. S. Yau. Oct 66, 13p TR-66-105
Contract N00014-66-C020A03, Grant AF-AFOSR-98-65
Proj. NR-373-502

Descriptors: (*Automata, *Input-output devices), Graphics, Set theory, Model theory, Machine translation.

Identifiers: Sequential machines.

It has been shown that the set of output sequences of a sequential machine due to a regular set of input sequences is regular. However, there is no method of generating the regular expression for the output regular set. The purpose of this paper is to present such a technique which is based on constructing the output graph from the state graph of the sequential machine and the input regular expression. Once the output graph is obtained, the regular expression can readily be obtained by using the signal flow graph techniques proposed by Brzozowski and McCluskey. The technique presented in this paper can be applied to both Moore and Mealy machines. (Author)

AD-641 808 **Field 9B**
Not available from CFSTI.
California Univ., Berkeley. Electronics Research Lab.
ON THE BOUND TO THE MEMORY OF A SEQUENTIAL MACHINE,
by Arthur Gill. 8 Feb 65, 4p
Grant AF-AFOSR-639-64
Proj. AF-9749
Task 974901
AFOSR-66-0028
Revision of manuscript submitted 4 Dec 64.
Availability: Published in IEEE Transactions on Electronic Computers vEC14 n3 p464-6 Jun 1965.

Descriptors: (*Automata, *Computer storage devices), Input-output devices, Mathematical analysis.

Identifiers: Sequential machines.

AD-641 809 **Field 9B, 9D**
Not available from CFSTI.
California Univ., Berkeley. Electronics Research Lab.
ON THE ERROR CORRECTING CAPACITY OF FINITE AUTOMATA,
by Michael A. Harrison. 8 May 64, 23p
Grant AF-AFOSR-639-64
Proj. AF-9749
Task 974901
AFOSR-66-0029
Prepared for presentation at the International Colloquium on Automata Theory and Algebraic Linguistics, Jerusalem, Israel, August 24-25, 1964.
Availability: Published in Information and Control v8 n4 p430-50 Aug 1965.

Descriptors: (*Automata, *Coding), Errors, Corrections, Information theory.

One interesting application of sequential machines is to consider them as encoders and decoders for an information channel. In a sequence of papers, Neumann (1962, 1962, and 1964) has exploited the properties of automata to study such codings. Schutzenberger (1964) has studied the synchronizing properties of such codes. In Neumann's work, the possibility of noise in the channel was considered. Winograd (1964) generalized the model to the case where the decoder was a finite automaton which corrected a set of errors prescribed by an

error relation; the idea being that the noise in the channel is describable by a relation. A related study of errors on regular sets has been made by Hartmanis and Stearns (1963). In this paper, the author obtained results concerning the structure of error correcting automata. Another reason for the study of these automata is that the regular sets which they recognize are particularly simple. In fact, these events are the natural generalization of the definite events (Perles, Rabin, and Shamir, 1963; Brzozowski, 1963). (Author)

AD-641 810 **Field 9B, 12A**
Not available from CFSTI.
California Univ., Berkeley. Electronics Research Lab.
ON ASYMPTOTIC ESTIMATES IN SWITCHING AND AUTOMATA THEORY.
Revised ed.,
by Michael A. Harrison. Jun 65, 8p
Grant AF-AFOSR-639-64
Proj. AF-9749
Task 974901
AFOSR-66-0661
Revision of manuscript submitted Feb 1965.
Availability: Published in Journal of the Association for Computing Machinery v13 n1 p151-7 Jan 1966.

Descriptors: (*Switching circuits, Theory), (*Automata, Theory), Combinatorial analysis, Asymptotic series, Special functions (Mathematical), Groups (Mathematics).

Formulas and algorithms have recently been given for calculating the number of symmetry types of functions, networks and automata under various transformation groups. In almost all cases, the computations involved are quite difficult and require the use of a digital computer. In this paper, asymptotic estimates are given for these numbers, which are trivial to compute and which are very accurate in most cases even for small values of the parameters. (Author)

N66-33441 **Field 9B**
CFSTI Prices HC$5.00 MF$1.25
Massachusetts Inst. Of Tech., Cambridge. Electronic Systems Lab.
MINIMAX CONTROLS OF UNCERTAIN SYSTEMS.
by H. S. Witsenhausen. May 66, 184p NASA-CR-77050, ESL-R-269
Grant NSG-496

Descriptors: *Control system, *Decision theory, *Uncertainty, Addition, Algorithm, Bound, Control, Controller, Decision, Design, Differential, Dynamic, Factor, Game, Linear, Maximum, Minimum, Performance, Problem, Programming, System, Theory, Time, Vector.

For abstract, see STAR 04 19.

N66-37813 **Field 9B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE TASK MANAGER.
by W. D. Carpenter. Oct 65, 14p NASA-TM-X-53341, X-542-65-445

Descriptors: *Data processing, *Management planning, Analysis, Chart, Design, Documentation, Flow, Job, Programming, Schedule, Simulation, System.

For abstract, see STAR 04 23.

N66-38408 **Field 9B**
CFSTI Prices HC$2.50 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A STORED PROGRAM COMPUTER FOR SMALL SCIENTIFIC SPACECRAFT.
by R. A. Cliff. Oct 66, 56p NASA-TN-D-3640

Descriptors: *Computer design, *Spacecraft component, Computer, Memory, Minimum, Power, Program, Spacecraft, Store.

For abstract, see STAR 04 23.

N66-38708 **Field 9B**
CFSTI Prices HC$2.00 MF$0.50
National Bureau Of Standards, Washington, D. C.
A COMPUTER PROGRAM FOR INVESTIGATING COMPUTER AND OPERATING SYSTEM TURN-AROUND FOR PROBLEMS EMPLOYING MULTIDIMENSIONAL ARRAYS.
by G. W. Reitwiesner. 2 Aug 65, 46p NASA-CR-78504, NBS-8936
NASA ORDER R-98

Descriptors: *Computer program, *Systems engineering, Array, Atmosphere, Capability, Computer, Data, Engineering, Investigation, Multidimensional, Operation, Problem, Program, System, Turn.

For abstract, see STAR 04 23.

N66-38720 **Field 9B**
CFSTI Prices HC$3.00 MF$0.75
National Bureau Of Standards, Washington, D. C.
THE MEASUREMENT OF PROGRAM LOOPING SPEED IN DIGITAL COMPUTERS THROUGH MATRIX INVERSION BY PARTITIONING.
by G. W. Reitwiesner. 2 Aug 65, 82p NASA-CR-78492, NBS-8935
NASA ORDER R-98

Descriptors: *Computer program, *Digital computer, *Fortran, *Matrix algebra, Circuit, Computer, Digital, Internal, Inversion, Loop, Matrix, Measurement, Partition, Program, Speed.

For abstract, see STAR 04 23.

N66-38724 **Field 9B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
COMPUTER DERIVATIONS OF EQUATIONS OF MOTION IN A GENERAL ORTHOGONAL CURVILINEAR COORDINATE SYSTEM USING THE FORMAC LANGUAGE.
by J. C. Howard. 1961, 20p NASA-TM-X-57914

Descriptors: *Computer program, *Coordinate transformation, *Digital computer, *Motion equation, *Particle motion, Coefficient, Computer, Coordinate, Curvilinear, Data, Differential, Digital, Equation, Motion, Orthogonal, Particle, Processing, Program, System, Transformation.

For abstract, see STAR 04 23.

AD-236 885 See Field 6D

AD-406 277 See Field 13J

AD-443 844 See Field 6D

AD-478 089 See Field 14E

AD-641 386 See Field 8E

AD-641 489 See Field 9E

AD-641 502 See Field 17G

AD-641 564 See Field 5B

AD-641 603 See Field 17I

AD-641 640 See Field 17I

AD-641 641 See Field 17I

AD-641 667 See Field 12A

AD-641 727 See Field 12A

AD-641 813 See Field 5J

AD-641 851 See Field 5A

AD-641 943 See Field 9A

AD-641 963 See Field 8E

AD-641 986 See Field 14B

N66-38296 See Field 8G

PB-173 474 See Field 6E

PB-173 477 See Field 5B

PB-173 514 See Field 5G

9C. ELECTRIC AND ELECTRONIC ENGINEERING

AD-224 277 **Field 9C, 13D**
CFSTI Price: HC$1.10
RAND Corp., Santa Monica, Calif.
THE ADVANTAGES OF FUNCTIONAL PACKAGING OF ELECTRONIC EQUIPMENT.
by E. H. Sharkey. 11 Mar 59, 10p P-1629

Descriptors: (*Operational readiness, Packaging), (*Electronic equipment, *Packaging), Maintainability, Airborne.

The physical method of packaging an electronic equipment, especially a large complicated one, can have considerable influence on the usefulness of the system, particularly in the area of the system's maintainability. If one packages large systems so that, to the greatest extent possible, an equipment function or sub-function is also a physically-replacable box, one will help minimize aircraft out-of-commission time. In large airborne electronic systems for either military or commercial use, a high stake is involved in military readiness or in profitable operation, in keeping down to an absolute minimum aircraft out-of-commission time due to electronic troubles. The present discussion is concerned primarily with how packaging methods can materially affect the out-of-commission time of the aircraft, and the costs and difficulties of line maintenance.

AD-641 709 **Field 9C**
Not available from CFSTI.
California Univ., Berkeley. Electronics Research Lab.
LIMITING STABLE CURRENTS IN BOUNDED ELECTRON AND ION STREAMS,
by W. B. Bridges, J. I. Frey, and C. K. Birdsall.
25 Jan 65, 11p
Grant AF-AFOSR-139-64
Proj. AF-4751
AFOSR-66-0042
Availability: Published in IEEE Transactions on Electron Devices vED12 n5 p264-72 May 1965.

Descriptors: (*Electron beams, Electric currents), (*Ion beams, Ionic current), (*Diodes (Electron tubes), Electron beams), Space charges, Electrodes, Electron tubes, Electrical properties, Equations, Gain.

Identifiers: Perveance.

The classical static analysis of the infinite planar diode was extended to include the effects of finite transverse beam size. Simple expressions were found for the increase in maximum stable current density over that of an infinite stream for finite cylindrical and strip streams flowing between plates

of infinite diodes. The results are also given in terms of stream perveance. The effect of a nonuniform distribution of current across the stream is shown to be relatively small. Experimental values of maximum stable current agree with those obtained from the analysis. A further extension of the static analysis was made to include the effects of additional conducting plane boundaries parallel to the stream motion. For length-to-width ratios L/D less than 0.25 the tube is adequately described by the results for the infinite planar diode and for L/D greater than 4, the infinitely-long drift tube theory suffices. At intermediate values of L/D, the maximum amount of current that can be stably passed through the tube is greater than that predicted by either asymptotic theory. (Author)

N66-32704 **Field 9C**
CFSTI Prices HC$1.00 MF$0.50
Tennessee Univ., Knoxville. Dept. Of Electrical Engineering.
MINIMUM ENERGY TIME-OPTIMAL CONTROL FOR SATURATING SAMPLED-DATA SYSTEMS.
by J. C. Hung, and A. M. Revington. 22 Oct 64, 5p NASA-CR-59648
Grant NSG-351

Descriptors: *Fuel flow regulator, *Linear programming, *Sampled data system, *Time optimal control, Computer, Control, Data, Flow, Fuel, Input, Optimal, Regulator, Sample, Saturation, System, Theory, Time.

For abstract, see STAR 04 19.

N66-33393 **Field 9C**
CFSTI Prices HC$3.00 MF$0.50
Rice Univ., Houston, Tex. Dept. Of Electrical Engineering.
MODIFIED TECHNIQUE FOR MEASURING DIELECTRIC CONSTANTS USING A RECTANGULAR CAVITY RESONATOR.
by J. K. Sinha. 1962, 52p NASA-CR-77002
Grant NSG-6

Descriptors: *Cavity resonator, *Dielectric constant, *Measuring apparatus, Apparatus, Cavity, Constant, Dielectric, Measurement, Operation, Rectangle, Resonator, Technique, Theory, Tuning.

For abstract, see STAR 04 19.

N66-33455 **Field 9C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
USE OF PHASE-LOCKED-LOOP CONTROL FOR DRIVING ULTRASONIC TRANSDUCERS.
by L. J. Smith. Aug 66, 10p NASA-TN-D-3567
Contract 129-03-03-03-22

Descriptors: *Frequency control, *Phase lock, *Ultrasonic wave transducer, Amplitude, Control, Electronics, Frequency, Lock, Loop, Magnetostriction, Oscillation, Phase, Resonant, Transducer, Ultrasonic, Wave.

For abstract, see STAR 04 19.

N66-37675 **Field 9C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
THE CURRENT MEASUREMENT IN LAUNCH VEHICLE CHECKOUT.
by W. F. Huseonica. Oct 66, 26p NASA-TN-D-3585
Contract 491-21-00-00-76

Descriptors: *Centaur launch vehicle, *Electric current, *Electric equipment, Actuator, Checkout, Input, Inverter, Load, Measurement, Power, Record, Shunt, Solenoid, Static, Voltage.

For abstract, see STAR 04 23.

N66-37901 **Field 9C**
CFSTI Prices HC$2.00 MF$0.50
Massachusetts Inst. Of Tech., Cambridge. Electronic Systems Lab.
COMPUTER-AIDED ELECTRONIC CIRCUIT DESIGN. CONDUCTION PROCESSES IN THIN FILMS STATUS REPORT, 1 DEC. 1965 - 31 MAY 1966.
Jun 66, 44p NASA-CR-78434, ESL-SR-274
Grant NSG-496

Descriptors: *Circuit, *Computer method, *Conduction, *Thin film, Cadmium, Design, Digital, Electronic, Magnetic, Memory, Network, Process, Program, Simulation, Sulfide, Triode, Vacuum.

For abstract, see STAR 04 23.

N66-38416 **Field 9C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TEN-BIT ANALOG-TO-DIGITAL CONVERTER.
by R. S. Lee. Oct 66, 10p NASA-TN-D-3666
Contract 879-10-03-01-51

Descriptors: *Analog-to-digital converter, *Sampling, *Space flight, Accuracy, Circuit, Conversion, Count, Data, Electronic, Gate, Quantization, Reference, Resolution, Technique, Transistor, Use, Voltage.

For abstract, see STAR 04 23.

PB-173 450 **Field 9C, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
RF SIGNAL GENERATOR SETS, AN/URM-25, AN/URM-25A, AN/URM-25B.
Technical manual instrument calibration procedure, VG-17.
1 Oct 66, 20p
NAVAIR-17-20VG-17

Descriptors: (*Test equipment (Electronics), Calibration), (*Calibration, Signal generators), Radiofrequency, Instruction manuals.

PB-173 500 **Field 9C, 9E, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Naval Personnel Representative, Pomona, Calif. Metrology Engineering Center.
RF SIGNAL GENERATOR SET, AN/URM-25D (SG-85/URM-25D), AN/URM-25E (SG-111/URM-25E).
Technical manual instrument calibration procedure, VG-18.
15 Oct 66, 19p
NAVAIR-17-20VG-18

Descriptors: (*Signal generators, Radiofrequency generators), (*Calibration, Signal generators), Instruction manuals, Test equipment (Electronics), Test methods.

This procedure describes the calibration of the AN/URM-25D (SG-85/URM-25D) and AN/URM-25E (SG-111/URM-25E) rf signal generator sets.

PB-173 501 **Field 9C, 10B**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Naval Personnel Representative, Pomona, Calif. Metrology Engineering Center.
KLYSTRON POWER SUPPLY 715A, H12-715A, PP-2854/U (Hewlett-Packard).
Technical manual Instrument Calibration Procedure, GH-02.
15 Sep 66, 13p

NAVAIR-17-20GH-02

Descriptors: (*Power supplies, Klystrons), Calibration, Instruction manuals, Test equipment (Electronics), Test methods.

This procedure describes the calibration of the Hewlett-Packard 715A or H12-715A, or PP-2854/U klystron power supply, herein referred to as the Test Instrument. This procedure was prepared by the Metrology Engineering Center, NAVPLANTREP, Pomona, California. All comments concerning this procedure should be directed to the Metrology Engineering Center.

PB-173 502 **Field 9C, 9E, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Naval Personnel Representative, Pomona, Calif. Metrology Engineering Center.
AUDIO OSCILLATOR, LAJ-4.
Technical manual instrument calibration procedure VG-08.
1 Nov 66, 10p
NAVAIR-17-20VG-08

Descriptors: (*Oscillators, Audiofrequency), (*Calibration, Oscillators), Test methods, Test equipment (Electronics), Instruction manuals.

This procedure describes the calibration of the LAJ-4 audio oscillator.

PB-173 503 **Field 9C, 9A, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Naval Personnel Representative, Pomona, Calif. Metrology Engineering Center.
VOLTAGE STANDING WAVE RATIO 3/8 IN. COAXIAL INSTRUMENTS WITH TYPE N CONNECTORS: FREQUENCY RANGE 0.02 TO 10.0 GHZ VSWR RANGE, 1.04 TO 10.0.
Technical manual instrument calibration procedure, GV-09.
1 Oct 66, 17p
NAVAIR-17-20GV-09
NAVWEPS 17-20VG-09 dated 1 Oct 65, superseded.

Descriptors: (*Instrumentation, Coaxial cables), Calibration, Standing wave ratios, Instruction manuals, Test methods, Test equipment (Electronics), Radiofrequency.

This procedure describes the measurement of the voltage standing wave ratio (VSWR) of 3/8 in. coaxial instruments having type N connectors, at frequencies of from 0.02 to 10.0 GHz. Appendix A contains a list of instruments which may be calibrated by this procedure, and includes the manufacturer's maximum acceptable VSWR for each instrument. This procedure can also be used for measuring the VSWR of other 3/8 in. coaxial instruments at frequencies of from 0.02 to 10.0 GHz.

PB-173 504 **Field 9C, 14B, 9E**
CFSTI Prices: HC$1.00 MF$0.50
Data-Design Labs., Ontario, Calif.
160 AND 160A POWER SUPPLIES, 161 AND 163 PULSE GENERATORS, 162 WAVEFORM GENERATOR (TEKTRONIX).
Technical manual instrument calibration procedure, AQ-46.
15 Aug 66, 22p
Contract N123 (62861)53723A
NAVAIR-17-20AQ-46

Descriptors: (*Power supplies, Calibration), (*Pulse generators, Calibration), (*Waveform generators, Calibration), Instruction manuals, Test equipment (Electronics), Test methods.

This procedure describes the calibration of the Tektronix 160 and 160A power supplies, 161 and 163 pulse generators, and the 162 waveform generator. The Tektronix 160 series may be mounted in any combination desired using an adapter frame for mounting in a standard 19-inch relay rack.

AD-452 983 See Field 20L

AD-463 062 See Field 17B

AD-481 365 See Field 17B

AD-481 367 See Field 17B

AD-641 360 See Field 20I

AD-641 792 See Field 12B

AD-641 851 See Field 5A

AD-641 982 See Field 16B

PB-173 485 See Field 14B

PB-173 517 See Field 14B

9D. INFORMATION THEORY

AD-116 555 Field 9D
CFSTI Price: HC$5.60
RAND Corp., Santa Monica, Calif.
THE THEORY OF INFORMATION.
Research memo.,
by Edgar Reich. 20 Sep 50, 51p RM-454
Contract AF 33 (038)-6413

Descriptors: (*Information theory, Reliability), Probability, Statistical analysis.

This report discusses the modern theory of 2-point unidirectional communication that is associated with the names of Shannon and Wiener in the light of Shannon's Theory of information. While being for the most part an outline of Shannon's classical paper 'A Mathematical Theory of Communication', the report also sketches some applications and presents a discussion on the question of uniqueness of formulation of the theory of information.

AD-641 561 Field 9D
CFSTI Prices: HC$3.00 MF$0.50
Hawaii Univ., Honolulu. Dept. of Electrical Engineering.
SOME RESULTS ON CYCLIC CODES WHICH ARE INVARIANT UNDER THE AFFINE GROUP.
Interim rept.,
by T. Kasami, S. Lin, and W. W. Peterson. 15 Aug 66, 51p Scientific-9
Contract AF 19 (628)-4379
Proj. AF-5628
Task 562801
AFCRL-66-622

Descriptors: (*Coding, *Invariance), Groups (Mathematics), Information theory, Permutations, Polynomials, Matrix algebra.

Identifiers: Cyclic codes.

First, some general properties of codes which are invariant under the permutation groups were given. For these codes an interesting relation is given between the minimum weights of dual codes. Secondly, results on minimum weights in BCH codes are presented, and exact minimum weights have been established for a number of subclasses of NBCH codes. In every case, the minimum weight equals the BCH bound. Finally, a number of results on Ree-Muller codes are presented, including a new generalization to the non-binary case and a derivation of the exact minimum weight for these codes, and in some cases the number of minimum weight code words. (Author)

AD-641 562 Field 9D
CFSTI Prices: HC$2.00 MF$0.50
Hawaii Univ., Honolulu. Dept. of Electrical Engineering.
ON THE BURST-ERROR-CORRECTING RECURRENT CODES,
by Arthur W. Epley, and Shu Lin. 15 Aug 66, 45p Scientific-10
Contract AF 19 (628)-4379
Proj. AF-5628
Task 562801
AFCRL-623

Descriptors: (*Coding, Corrections), (*Errors, Coding), Optimization, Matrix algebra, Combinatorial analysis.

Identifiers: Burst-error-correcting codes.

Burst-error-correcting recurrent codes are studied in detail. The work of Hagelbarger, Wyner and Berlekamp is reviewed and discussed. A new class of codes with low transmission rate R is introduced, and the merits of these codes are discussed. A procedure for construction of a generalized code from known codes is presented, and theorems concerning this construction are proved. (Author)

AD-641 686 Field 9D, 17B
Not available from CFSTI.
California Univ., Berkeley. Dept. of Electrical Engineering.
COMPARISON OF SEQUENTIAL AND NONSEQUENTIAL DETECTION SYSTEMS WITH UNCERTAINTY FEEDBACK,
by G. L. Turin. 24 May 65, 6p
Grant AF-AFOSR-230-64
Proj. AF-9749
Task 974901
AFOSR-66-1207
Availability: Published in IEEE Transactions on Information Theory vIT12 n1 p5-8 Jan 1966.

Descriptors: (*Detection, *Information theory), Uncertainty, Feedback, Signals, Optimization, Sequences, Communication systems, Analysis.

Identifiers: Sequential detection.

In a previous paper, it was found that optimal signals for, and evaluated the performance of, a binary sequential detection system in which the detector constantly feeds back to the transmitter its 'state of uncertainty' concerning what is being sent. The present paper considers a similar system, which uses a nonsequential detector. Comparison of the results of the two papers shows that: (1) when the prescribed peak-to-average power ratio is small, the sequential system operates with a 6-dB average-power advantage over the nonsequential system; (2) when the prescribed peak-to-average power ratio is large, the sequential system operates with a 6-dB peak-power advantage over the nonsequential system. In both systems, the performance improves rapidly as the peak-power constraint is relaxed, i.e., as the prescribed peak-to-average power ratio is increased. (Author)

N66-38419 Field 9D
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DATA CONVERTER AND DISPLAY SYSTEM FOR THE WISCONSIN EXPERIMENT ON THE ORBITING ASTRONOMICAL OBSERVATORY.
by S. R. Smith. Oct 66, 23p NASA-TN-D-3679
Contract 831-12-03-01-51

Descriptors: *Data converter, *Display system, *Oao, Conversion, Data, Design, Electronic, Experiment, Interface, Logic, Optical, Spacecraft, Storage.

For abstract, see STAR 04 23.

AD-641 325 See Field 17B

AD-641 431 See Field 17B

AD-641 809 See Field 9B

9E. SUBSYSTEMS

AD-227 192 Field 9E, 17B, 5I
CFSTI Price: HC$14.60
Carmody Corp., Buffalo, N. Y.
BASIC DEVELOPMENT ACCOMPLISHED ON WIDE-ANGLE, NONPROGRAMMED, VISUAL PRESENTATIONS. VOLUME I,
by Andrew R. Molnar, and William A. Lybrand. Apr 59, 142p
Contract N61339-404

Descriptors: (*Display systems, *Training devices), Aircraft, Design, Flight simulators, Military personnel, Motion pictures, Ships, Tanks (Combat vehicles), Television communication systems.

In this age of rapid technological advance, it becomes important to have ready information on what has been accomplished in a specific area in order to establish a basis for future development. Until recently, little commercial interest existed in simulation of the 'real visual world'. Most research and development in this area was sponsored by the government for military training purposes. This report provides the first summary of the efforts undertaken in the development of wide-angle, non-programmed visual presentation. The study also includes recommendations for additional investigations to define and detail the requirements for presentation of visual cues, because little is known about the visual-perceptual laws especially in dynamic situations.

AD-251 107 Field 9E
CFSTI Price: HC$1.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A TRANSISTORIZED FREQUENCY STANDARD.
Group rept.,
by P. L. Fleck. 26 Jan 60, 15p GR-34-85
Contract AF 19 (604)-5200

Descriptors: (*Crystal oscillators, Design), (*Frequency, Standards), (*Oscillators, Quartz), Radiofrequency, Tests.

An existing transistorized frequency standard was completely redesigned in order to improve its operation and make it more suitable for our particular applications. The crystal and oven were the only components retained in the new design. The design and performance of the modified frequency standard are described. One of the original design criteria was to keep the oscillator inexpensive, yet stable and reliable. This implies that the design should be as simple as possible. Another desideratum was to use transistors as the active elements thereby allowing the whole circuit to be battery operated (hopefully with low power consumption) and to be mounted in the oven. Also, it was decided to build the system with high thermal inertia so that, in the event of heater power shutoff, the frequency drift would be minimized. (Author)

AD-44 181 Field 9E, 20A
CFSTI Price: HC$3.60
Johns Hopkins Univ., Jamestown, R. I. Systems Research Field Lab.
AN AUDIO TIMER.
Technical rept.,
by R. G. Roush. Apr 53, 33p
Contract N5ori-166 (01)
SPECDEVCEN-166-1-21

Descriptors: (*Timing circuits, Operation), Production, Sound signals.

An electronic keying circuit which serves to produce short bursts of tone for auditory investigations is described herein. Four single-cycle multivibrators independently variable in duty - cycle and one variable free-running symmetrical multivibrator form the basis of a two channel electronic switching circuit in which independent operation of each channel may be realized.

AD-481 611 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Bendix Corp., Davenport, Iowa. Pioneer-Central Div.
FREQUENCY TEMPERATURE COMPENSATION TECHNIQUES FOR QUARTZ CRYSTAL OSCILLATORS.
Quarterly rept. no. 9, 1 Sep-30 Nov 65,
by Ronald Kidman, and Carlos D. Dominguez.
7 Jan 66, 58p Rept. no. 3485-66
Contract DA-36-039-AMC-02282 (E)
Proj. DA-1P6-22001-A-058
See also AD-485 171.

Descriptors: (*Crystal oscillators, Quartz), Circuits, Thermal stability, Performance (Engineering), Medium frequency, High frequency, Programming (Computers).

Development of a linearized network approach has led to the generation of three separate computer programs. The three programs offer varying degrees of compensation, based on increasing circuit complexity. Successful application of these programs has been made in compensating the Group II oscillators. In conjunction with the programming effort, a preliminary investigation has been made to determine the effects of component tolerances on compensation. The Group II oscillator design was refined, and the improved features were incorporated in the final assembly of the oscillators. Circuit function and performance details are included in this report. First order compensation of these three oscillators indicates that the desired stability characteristics will be achieved during the next quarter. The oscillator aging experiment was initiated using eight oscillators housed in a stabilized-temperature enclosure. Compensation of these oscillators will be made as soon as initial aging trends are determined. Frequency adjustment studies were continued and resulted in a trimming method utilized in the Group II oscillators which provides minimal effect on the degree of compensation. (Author)

AD-482 059 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Computer Control Co., Inc., Framingham, Mass.
EVALUATION OF FLIP/CHIP INTEGRATED CIRCUIT INTERCONNECTIONS.
Interim development rept. 16 Jan-16 Apr 66.
13 May 66, 22p
Contract NObsr-95052
Proj. SR008-0303
Task 9624
See also AD-640 670.

Descriptors: (*Circuit interconnections, *Integrated circuits), Thermal properties, Aluminum, Ultrasonic welding, Soldering, Glass, Substrates, Silicon, Performance (Engineering), Resistance (Electrical), Aluminum compounds, Oxides, Beryllium compounds.

The objective of this contract is to perform a critical evaluation of the Flip/Chip approach to interconnecting integrated chip circuits within a common package. The simulation of the package thermal characteristics was completed. Work is in progress on a matrix experiment on aluminum-to-aluminum ultrasonic bonding conditions. Solder pads have been prepared on 7059 glass substrates and on silicon chips for solder bonding experiments. (Author)

AD-485 171 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Bendix Corp., Davenport, Iowa. Pioneer-Central Div.
FREQUENCY TEMPERATURE COMPENSATION TECHNIQUES FOR QUARTZ CRYSTAL OSCILLATORS.
Quarterly rept. no. 10, 1 Dec 65-28 Feb 66,
by C. D. Dominguez, and R. D. Kidman. Jul 66,
31p Rept. no. 3537-66
Contract DA-36-039-AMC-02282 (E)
Proj. DA-1P6-22001-A-058
ECOM-02282-10
See also AD-481 611.

Descriptors: (*Crystal oscillators, Quartz), Medium frequency, High frequency, Thermal stability, Aging (Materials), Performance (Engineering), Circuits.

The purpose of this project is to develop design techniques for three groups of compensated crystal oscillators operating in the frequency range of 1 to 20 megacycles with design goal frequency temperature stabilities of plus or minus 1 x 10 to the minus 7th power and plus or minus 5 x 10 to the minus 8th power over specified ambient temperature ranges as given in U. S. Army Electronics Command Technical Requirement SCL-6657 dated 13 October 1964. Experimental results obtained on the three Group II oscillator units are presented. The effects of loading and voltage regulation on unit performance are discussed. Representative frequency temperature measurement are shown to demonstrate the repeatability characteristics of the three units during and after compensation. A discussion of preliminary results of the aging experiment is given. Representative characteristics of the aging units are presented. These indicate the need for accumulating more aging data on oscillator units to determine the long term effects and the repeatability of frequency temperature characteristics. The mechanical layout of the Group III oscillator units was initiated. These units will be built to fit inside a GFE oven. Since the oven parameters have yet to be specified, this layout has remained on a tentative basis. (Author)

AD-641 362 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Cruft Lab., Harvard Univ., Cambridge, Mass.
THE INTEGRAL EQUATION FOR THE CURRENT IN AN ASYMMETRICALLY DRIVEN, THICK TUBULAR ANTENNA.
Technical rept.,
by S. R. Seshadri, and Tai Tsun Wu. Jun 66, 24p
TR-503
Contract Nonr-1866 (32)
Proj. NR-371 016
See also AD-637 990.

Descriptors: (*Antennas, Electric currents), (*Integral equations, Antennas), Pipes, Thickness, Cylindrical bodies, Electromagnetic waves, Theory.

The coupled integral equations for the transverse and axial currents in an electrically thick tubular antenna are derived for the case in which it is driven along an infinitesimally narrow circumferential gap by an emf which is allowed to vary along the circumference. The emf is assumed to be maintained either on the outside surface only, or on the inside surface only, or on both the surfaces of the tube, as in the conventional treatments of antenna theory. For the special case of a driving emf which is uniform around the circumference, the transverse currents are not excited and the integral equation for the total axial current is shown to reduce to the known results both for the case in which the emf is maintained on both the outside and the inside surfaces of the tube and for which it is on the outside surface only. (Author)

AD-641 413 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Radio Corp. of America, New York. Advanced Communications Lab.
SIGNAL ENHANCEMENT TECHNIQUES.
Quarterly progress rept. no. 1, 1 May-31 Jul 66,
by E. Markard, R. Ernst, P. Torrione, and S. Perlow. Oct 66, 84p CR-66-565-37
Contract DA-28-043-AMD-02280 (E)
Task 5A6-79191-D902-0317
ECOM-02280-1

Descriptors: (*Mixers (Electronics), Signal-to-noise ratio), (*Frequency converters, Signal-to-noise ratio), Noise (Radio), Modulation, Varactor diodes, Diodes (Semiconductor), Phase (Electronics), Amplifiers.

A variable gamma parametric mixer was developed in which the co-channel intermodulation components were substantially reduced over that obtainable in conventional mixers. The basic technique relies on achieving a prescribed nonlinearity through the use of selected diodes and various local oscillator drive conditions, so that the device harmonic content is controlled. A reversal of phase occurs identical to the intermodulation products without affecting the desired output frequencies, thereby resulting in a distortion cancellation. Results show that two - 20 dBm equal level signals produce intermodulation products which are greater than 60 dB below the output level. The intermodulation distortion of conventional mixers and amplifiers is outlined in Appendix B. The theory indicated that all distortion products could be related to the power saturation of the device under test. In addition, a study of low resistor mixers was initiated in which it directly appears that selected hot carrier diodes, under fully pumped conditions, could yield a O dB conversion loss (image frequency properly terminated). A technique has also been reported in which a phase sensitive degenerate parametric amplifier could be utilized to substantially increase the signal to noise ratio of a given receiver. (Author)

AD-641 461 **Field 9E, 13H**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Lynchburg, Va. Communication Products Dept.
MICROMINIATURE CRYSTAL UNIT TYPE CR-(XM-47)/U PRODUCTION ENGINEERING MEASURE.
Quarterly progress rept., 27 Feb-27 May 66,
by R. L. Hatcher, and R. D. Laney. 27 May 66, 23p
Contract DA-36-039-AMC-06166 (E)
See also AD-633 322.

Descriptors: (*Crystals, Microminiaturization (Electronics)), (*Crystal oscillators, Manufacturing methods), Aging (Materials), Electron beam welding, Reliability (Electronics), High frequency.

Progress report on a program to establish production techniques and demonstrate the capability of a pilot facility to manufacture reliable Microminiature Crystal Units Type CR- (XM-47)/U at a specified rate of 20 units per eight (8) hour shift. The solution to the aging problem was demonstrated with the submission of an additional engineering sample. The electron beam welder demonstrated production capability. The quality plan was submitted to the customer.

AD-641 468 **Field 9E, 9A**
Not available from CFSTI.
Stanford Univ., Calif. Stanford Electronics Labs.
LOSSLESS TIME-VARYING IMPEDANCE SYNTHESIS,
by D. A. Spaulding. 22 Jul 65, 4p
Grant AF-AFOSR-337-63
Proj. AF-9749
Task 974901
AFOSR-66-0110
Availability: Published in Electronics Letters Aug 65.

Descriptors: (*Electrical networks, Synthesis), Electrical impedance, Transformers, Inductance, Capacitors.

Identifiers: Time-varying networks.

Finite n-port networks are characterised in terms of their impulse responses. The properties of passivity and losslessness are used to specify the form of the impulse response and to give a synthesis using time-varying transformers and time-invariant inductors, capacitors and gyrators. (Author)

AD-641 469 Field 9E
Not available from CFSTI.
Stanford Univ., Calif. Stanford Electronics Labs.
DEGENERATE NETWORKS,
by B. D. Anderson, and R. W. Newcomb. 1966, 4p
Grant AF-AFOSR-337-63
Proj. AF-9749
Task 974901
AFOSR-66-1244
Availability: Published in Proceedings of the IEEE v54 n4 p694-5 Apr 1966.

Descriptors: (*Networks, Theory), Electrical impedance, Admittance, Scattering.

In the study of network theory the description of networks by means of network matrices (e.g., the impedance matrix, the scattering matrix) has proved exceedingly useful. For linear, passive, time-invariant networks it is known that if an impedance or admittance matrix exists, then so does a scattering matrix; however, the converse is not true, as seen by the ideal transformer. In this letter, by considering linear passive but time-variable elements, some networks are exhibited which are describable by impedance or admittance matrices but not by a scattering matrix. For completeness various other degenerate networks are discussed. A set of networks not describable by one or more of the impedance, admittance, or scattering matrix is presented. (Author)

AD-641 471 Field 9E
Not available from CFSTI.
Stanford Univ., Calif. Stanford Electronics Labs.
AN INTEGRATABLE TIME-VARIABLE GYRATOR,
by W. New, and R. W. Newcomb. 29 Oct 65, 3p
Grant AF-AFOSR-337-63
Proj. AF-9749
Task 974901
AFOSR-66-0558
Availability: Published in Proceedings of the IEEE v53 n12 p2161-2 Dec 1965.

Descriptors: (*Electrical networks, Theory), Integrated circuits, Resistance (Electrical), Transistors, Time, Resistors, Capacitors.

Identifiers: Gyrators.

The article presents a gyrator realization which allows time-variable gyration resistances and which appears natural for integrated circuitry.

AD-641 473 Field 9E
Not available from CFSTI.
Stanford Univ., Calif. Stanford Electronics Labs.
PROPOSED ADJUSTABLE TUNED CIRCUITS FOR MICROELECTRONIC STRUCTURES,
by B. D. Anderson, W. New, and R. Newcomb.
21 Jan 66, 3p
Grant AF-AFOSR-337-63
Proj. AF-9749
Task 974901
AFOSR-66-1243
Availability: Published in IEEE Proceedings v54 n3 p411 Mar 1966.

Descriptors: (*Tuned circuits, *Microminiaturization (Electronics)), Integrated circuits.

The use of integrated circuits has led to a re-evaluation of the methods of circuit design. While active elements are very cheap, inductors are very expensive since they can be incorporated only with difficulty as actual elements in an integrated circuit and then only as fixed components. Since it is often of interest to have variable inductances available for tuning purposes, one method of obtaining electronically adjustable single or coupled coils is discussed.

AD-641 489 Field 9E, 9B
Not available from CFSTI.
Illinois Univ., Urbana. Dept. of Electrical Engineering.
COMPUTER DESIGN OF LINEAR FREQUENCY SELECTIVE NETWORKS.
Revised ed.,
by D. A. Calahan. 5 Apr 65, 8p
Grant AF-AFOSR-177-63
Proj. AF-9749
Task 974901
AFOSR-66-0388
Revision of manuscript submitted 16 Nov 64.
Availability: Published in Proceedings of the IEEE v53 n11 p1701-6 Nov 1965.

Descriptors: (*Programming (Computers), Electrical networks), (*Electrical networks, Design), Algorithms, Topology, Graphics, Filters (Electromagnetic wave).

An efficient algorithm is proposed for the computer synthesis of linear networks of arbitrary configuration. Given a circuit approximately realizing a network function T (s), the element values are perturbed until T (s) is precisely realized. In the process, positive elements may be 'grown' across nodes as required, or may be forced to desired values. Examples in the areas of passive and active filter design are given, and limitations of the procedure are discussed. Also, the method is shown to be related to the theory of equivalent networks. (Author)

AD-641 642 Field 9E
CFSTI Prices: HC$3.00 MF$0.75
Army Electronics Command, Fort Monmouth, N. J.
TECHNOLOGY, DESIGN AND APPLICATION OF INTEGRATED CIRCUITS.
Technical rept.
Aug 66, 71p ECOM-2747
Proj. DA-1E6-22001-A-440
Task 1E6-22001-A-440-00

Descriptors: (*Integrated circuits, Reports), Design, Epitaxial growth, Diffusion, Transistors, Films, Computer logic, Circuit interconnections, Packaging, Microminiaturization (Electronics), Radiation damage, Reliability (Electronics).

Contents: PART I - TECHNOLOGY - Basic physics; Introduction to integrated circuits; Epitaxial materials - processes, characterization, and applications; Diffusion; Artwork for integrated circuit layouts; Insulated gate field effect transistor; Thin and thick film components; Thin and thick film deposition techniques; Ancillary processes for integrated circuits; Nonconventional IC components and techniques. PART II - DESIGN - Basic transistor design; Integrated circuit design; Linear design techniques; Universal linear circuits; Custom integrated circuits; Comparison of digital logic circuits; MOS digital integrated circuits; Integrated circuit packages and interconnections; State-of-the-art, custom high-frequency circuits; Thin film hybrid integrated circuit design and layout. PART III - APPLICATION - Applications of digital integrated circuits; Application of integrated electronics; Integrated circuit interconnections and subassembly packaging; Microelectronic equipment design factors; Nuclear radiation effects on integrated circuits; Reliability; ECOM equipment support.

AD-641 648 Field 9E
CFSTI Prices: HC$4.00 MF$0.75
Rome Air Development Center, Griffiss AFB, N. Y.
SINGLE AND CASCADED WIDEBAND TRANSISTOR AMPLIFIERS,
by J. B. Payne. Sep 66, 104p RADC-TR-66-122
Proj. AF-4506
Task 450601

Descriptors: (*Transistor amplifiers, Broadband), Delay lines, Analysis, Configuration, Experimental data.

With the realization of high frequency transistors having current and power gain-bandwidth products in the gigacycle region, ultra wideband amplifiers are now possible. This report presents an analysis of the basic high frequency transistor configurations along with experimental data obtained from both single and multiple stage amplifiers having bandwidths ranging from 200 to 800 MHz. Included is a discussion of the important parameters that determine transistors high frequency response along with problems associated with layout and component selection. Various techniques for trading gain for bandwidth are treated and experimentally reported. A new approach for designing wideband cascaded amplifiers that require a minimum of adjustments yet yield near optimum performance is given. (Author)

AD-641 673 Field 9E, 18H, 9A
CFSTI Prices: HC$3.00 MF$0.75
IBM Electronics Systems Center, Owego, N. Y.
STUDY OF EFFECT OF HIGH-INTENSITY PULSED NUCLEAR RADIATION ON ELECTRONIC PARTS AND MATERIALS (SCORRE).
Final rept. 15 Jun 64-15 Jul 66,
by Paul G. Boczar, Gilbert E. Boyd, Wayne A. Cordwell, and Frank A. Frankovsky. Oct 66, 73p
Rept. no. 6
Contract DA-28-043-AMC-00212 (E)
Proj. DA-5901.21.700.01
ECOM-00212-F
See also AD-616 007.

Descriptors: (*Electronic equipment, *Radiation damage), (*Capacitors, Radiation damage), Data storage systems, Dielectrics, Magnetic cores, Tantalum capacitors, Mica capacitors, Ceramic capacitors, Glass capacitors, Polyester plastics, Styrene plastics.

Identifiers: SCORRE.

The report describes the radiation-induced behavior of tantalum-oxide, mica, ceramic, Mylar, glass, and polystyrene capacitors using results obtained at several sources. Also included are discussions of the following: Experimental techniques at each radiation source, including measurement of circuits, components, dosimetry, and variation of circuit and radiation parameters; Results from SPRF, LINAC, and AFXR tests describing the dependences of the induced current for the irradiated dielectric; Interpretation of these results in terms of appropriate models and radiation and circuit parameters; Comparison of the effects observed at each irradiation source; Description of the tests on magnetics and the test results. (Author)

AD-641 710 Field 9E
CFSTI Prices: HC$4.00 MF$1.00
Advanced Technology Corp., Timonium, Md.
STUDY OF ADAPTIVE ANTENNA TECHNIQUES FOR MILLIMETER WAVE APPLICATIONS.
Final rept., 15 Apr 65-15 Jul 66,
by J. M. Cotton, Jr. 15 Aug 66, 142p
Contract AF 19 (628)-5099
Proj. AF-4600
Task 460002
AFCRL-66-724

Descriptors: (*Antennas, Millimeter waves), Extremely high frequency, Troposphere, Scattering, Antenna apertures, Adaptive systems, Attenuation, Phase shift, Antenna arrays.

The study program was concerned with adaptive antenna techniques which could be utilized in the 35 - 100 GHz frequency range. Included are a survey of combining methods in general; discussion of the atmospheric limitations at millimeter wavelengths including an analysis of atmospheric dispersion; a discussion of the techniques peculiar to millimeter wavelengths; and a recommended state of the art combining system using available components. Also included are recommendations for laboratory feasibility models, a millimeter wave

interferometer system for atmospheric measurements and suggested development programs for components which would improve the potential and operating characteristics of the system. Throughout the study, emphasis was placed on very broad (i.e., 1 GHz or greater) bandwidth capabilities. (Author)

AD-641 711 **Field 9E**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Electrical Engineering.
MONOCHROMATIC ILLUMINATION OF CADMIUM-SULFIDE OSCILLATOR,
by R. M. White. 28 Apr 65, 3p
Grant AF-AFOSR-139-64
Proj. AF-4751
AFOSR-66-0043
Availability: Published in Proceedings of the IEEE v53 n7 p745-6 Jul 1965.

Descriptors: (*Crystal oscillators, Illumination), (*Cadmium compounds, Sulfides), Monochromatic light, Oscillation, Intensity, Resistance (Electrical), Semiconductors, Single crystals, Electric currents.

The period, waveform, and amplitude of current oscillations in a uniformly illuminated cadmium-sulfide oscillator have been found to depend strongly upon the wave-length and intensity of the light used. The observations described here show that a given feature of the oscillation (e.g., a particular waveshape) is not associated solely with a single wavelength, but rather that the wave-length at which the feature occurs depends upon the light intensity. The observations strongly suggest that the wavelength and intensity of illumination are not primary parameters, but rather, by their effects upon resistivity of the CdS, they affect the oscillations.

AD-641 713 **Field 9E, 9A**
Not available from CFSTI.
California Univ., Berkeley. Electronics Research Lab.
STABILITY OF LINEAR TIME-VARYING NETWORKS--THE STATE SPACE APPROACH.
Revised ed.,
by Ernest S. Kuh. 1 Nov 64, 11p
Grants AF-AFOSR-139-64, NSF-GP-684
Proj. AF-4751
AFOSR-66-0113
Revision of manuscript submitted 4 Sep 64.
Availability: Published in IEEE Transactions on Circuit Theory vCT-12 n2 p150-7 Jun 1965.

Descriptors: (*Electrical networks, Stability), Time, Resistors, Capacitors, Coils, Linear systems, Dynamics, Mathematical analysis.

Identifiers: Time-varying networks, State variables.

The paper is concerned with linear networks which contain time-varying resistors, inductors, and capacitors. The state-variables formulation is used to describe the general circuit. General sufficient conditions for Liapunov stability are derived in terms of the network parameters and the incidence submatrices of the graph. (Author)

AD-641 868 **Field 9E**
Not available from CFSTI.
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
ON STABILITY IN CONTROL SYSTEMS.
Revised ed.,
by Emilio Roxin. 22 Apr 65, 18p
Grant AF-AFOSR-693-64
Proj. AF-9749
Task 974901
AFOSR-66-0757
Revision of manuscript submitted 19 Feb 65.
Availability: Published in J. Siam Control v3 n3 SerA p357-72 1966.

Descriptors: (*Control systems, Stability), Dynamics, Set theory.

Definitions of different kinds of stability for generalized control systems are given, similar for those known for classical dynamical systems. It is shown that every kind of stability for dynamical systems corresponds to a strong and a weak similar property in the case of control systems. Strong, weak, and finite stability are investigated. (Author)

AD-641 898 **Field 9E**
CFSTI Prices: HC$4.00 MF$0.75
Polytechnic Inst. of Brooklyn, Farmingdale, N. Y. Dept. of Electrophysics.
THE SYNTHESIS OF NETWORKS CONTAINING LUMPED AND DISTRIBUTED ELEMENTS. PARTS I AND II.
Technical rept.,
by D. C. Youla, Plinio Tissi, and W. Kohler. Oct 66, 103p PIB-MRI-1323-66, PIB-MRI-1339-66
Contract AF 30(602)-3951
Proj. AF-8505
RADC-TR-66-489

Descriptors: (*Electrical networks, Synthesis), Circuits, Transmission lines, Matrix algebra.

Identifiers: N-port networks.

The paper is devoted to the synthesis of n-ports composed of the usual passive lumped building blocks and ideal uniform transmission lines possessing identical one-way delays. It is shown that the scattering matrix, W (p,s), of such a structure is two-variable bounded-real. A complete synthesis technique is evolved for purely reactive networks by introducing the concept of a minimal realization. Moreover, it is demonstrated that such lossless networks may be constructed with the absolute minimum number of lumped reactances and lines. Several theorems are also presented delineating the fine structure of nonminimal realizations and two examples serve to illustrate the basic synthesis approach. (Author)

AD-641 959 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
DIRECTIVITY OF AN ARRAY OF SLOTS ON THE SURFACE OF A CYLINDER.
Technical note,
by L. J. Ricardi. 10 Oct 66, 39p TN-1966-52
Contract AF 19(628)-5167
Proj. AF-649L
ESD-TR-66-451

Descriptors: (*Slot antennas, *Antenna arrays), Design, Cylindrical bodies, Antenna radiation patterns.

General expressions for the directivity of arrays of axial and circumferential slots on an infinite conducting cylinder are derived. Directivity patterns of uniformly excited arrays of several slot configurations are presented. The optimum spacing for 2, 3, 4, 5, 6, and 7 slot arrays on an infinite cylinder between one and four wave-lengths in diameter is presented and the minimum number of slots required to produce a uniform pattern in the equatorial plane is determined. (Author)

AD-641 978 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A METHOD OF ANALYSIS OF ANTENNA PROPERTIES.
Memorandum rept.,
by Keats A. Pullen. Jan 50, 44p BRL-MR-502
Proj. TB3-0538A

Descriptors: (*Antennas, Mathematical analysis), Antenna radiation patterns, Gain, Electrical impedance, Graphics, Dipole antennas, Helical antennas, Antenna arrays, Radar antennas, Numerical analysis.

A method of solving antenna radiation pattern, gain and radiation resistance problems is discussed. This method extends the techniques used on some planar radar arrays to antennas or arrays having arbitrary and possibly irregular shape. The first section discusses the fundamental principles of antennas and develops the equations to useable form for taking into account aspect, retardation, and electrical phase. It applies them to antenna gain and radiation resistance evaluation. The second section demonstrates applications to the following antennas: dipole, 30 degree Fishhook Antenna, Crossed Fishhook Antenna, unipole antenna, and helix antenna. In addition, use of the method to aid improvement of properties of a radiator is indicated. (Author)

AD-641 994 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Microwave Electronic Corp., Palo Alto, Calif.
INVESTIGATIONS OF BROADBAND FERROMAGNETIC POWER LIMITERS AND EXPANDERS AS DUPLEXING ELEMENTS FOR MICROWAVE SYSTEMS.
Final rept., 1 Jun 65-31 May 66,
by K. Mehta, and F. A. Olson. Oct 66, 40p
Contract DA-28-043-AMC-01372 (E)
Proj. DA-1P6-22001-A-055
See also AD-628 769.

Descriptors: (*Limiters, Ferromagnetic materials), (*Ferromagnetic materials, Microwave equipment), (*Duplexers (Electronic), Ferromagnetic materials), Helixes, Broadband, Yttrium compounds, Iron compounds, Garnet.

Coincidence limiting has been observed over a continuous passband from 2.2 to 3.9 GHz with a traveling-wave limiter employing magnetostatic modes in single-crystal YIG. Insertion loss was between 7 and 11 db with a 20-db dynamic limiting range. Insertion loss as low as 5 db has been observed at slightly reduced bandwidths. A theory for magnetostatic waves in axially and transversely magnetized ferrimagnetic rods has been formulated to aid in identification of specific magnetostatic modes. Progress has been made in devising new methods to reduce the insertion loss of the traveling-wave limiter. The utilization of ferrimagnetic materials to achieve broadband expanding (inverse of limiting) has been demonstrated. The expander operates at coincidence utilizing a single-crystal ferrimagnetic material in an absorption coupling configuration. Stripline and helical structures have been developed for expander operation, with the helical structure preferred because of the tight RF coupling that can be obtained between the structure and the ferrimagnetic resonators. A single YIG sphere in a helix structure yielded greater than 10-db expansion over a 400-MHz band centered at 3 GHz. (Author)

PB-173 175 **Field 9E, 9A**
CFSTI Prices: HC$5.60 MF$0.50
Micro State Electronics Corp., Murray Hill, N. J.
ACTIVE RC TRANSFER FUNCTION SYNTHESIS BY MEANS OF CASCADED RL AND RC STRUCTURES.
Research rept.,
by Isaac M. Horowitz. Feb 58, 55p PIB-503R-583-57
Contract AF 30(602)-1648
Proj. AF4506
Task 45360
AD-148 914, RADC-TN-58-258

Descriptors: (*Circuits, Mathematical analysis), Structures, Synthesis, Functions, Capacitors, Transistors, Resistors.

The report presents a method for realizing transfer functions with complex poles by means of resistors, capacitors and transistors. The outstanding feature of this method is the prior decomposition of network into separate RC and RL type blocks. The RL blocks are realized by means of R's, C's

and transistors. One pair of blocks (RL - RC) suffices for a total complex pole angle of 180 degrees while three (RL - RC - RL) are required for a total complex pole angle up to 360 degrees. It is found that a specific portion of the transistor 'activity' is required to replace inductors in realizing complex poles. The balance is available for gain or for the reduction of the sensitivity of the network to variations in the active parameters. Design methods for optimum exploitation of the transistor 'activity' are developed. To permit an intelligent choice between gain and sensitivity, the values of the sensitivity of the transfer function poles are calculated for each element in the respective networks. With the aid of this table, alignment techniques and procedures for reducing the sensitivity of the transfer poles to transistor drift, follow logically. (Author)

PB-173 482 **Field 9E, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Stanford Electronics Labs.
SYNTHESIS OF LUMPED-DISTRIBUTED RC n-PORTS.
Technical rept.,
by T. N. Rao, and R. W. Newcomb. Jun 66, 12p
TR-6558-9, SU-SEL-66-051
Grant NSF-GK-237

Descriptors: (*Electrical networks, Synthesis), Matrix algebra, Theory.

Identifiers: N-port networks.

Based upon the two-variable reactance matrix synthesis of Koga a method of synthesizing reciprocal networks constructed from uniformly distributed RC lines, lumper capacitors, lumped resistors, and transformers is outlined. The synthesis extends to that of nonreciprocal lumped-distributed lossless n-ports. (Author)

AD-641 985 **See Field 9A**

NBS-TN-295 **See Field 14B**

PB-173 500 **See Field 9C**

PB-173 502 **See Field 9C**

PB-173 504 **See Field 9C**

9F. TELEMETRY

AD-468 425 **Field 9F, 16D**
CFSTI Prices: HC$3.00 MF$0.50
Alabama Univ., University. Bureau of Engineering Research.
A THEORETICAL STUDY TO IMPROVE UTILIZATION OF MISSILE TELEMETRY SYSTEMS.
Final rept., 11 Apr 62-10 Jan 63,
by Richard S. Simpson, and J. Reese Burnett. Feb 63, 52p
Contract DA-01-009-ORD-1041

Descriptors: (*Telemeter systems, Guided missiles), Bandwidth, Telemetering data, Classification, Vibration, Pulse compression, Data, Analysis, Frequency.

Identifiers: Pershing.

Data bandwidth compression of slowly varying measurements can be accomplished using rather straightforward techniques. The extension of the concept of data compression to vibration measurements appears to be a natural step. However, considerable difficulty is encountered when this step is attempted by use of systems other than simple band-type analyzers. The major difficulty is that of extracting information from the raw data which will give the power density spectrum. This is an important facet of the process because the major portion of the possible data compression is concentrated in this step. In this work the band-type analyzer and the coherent memory-filter analyzers (CMF) have been considered as possible techniques for accomplishing the task. Only the band-type analyzer appears to be feasible under the strict hardware limitations imposed on non-tactical systems. Once the problem of obtaining the power density spectrum has been solved, adaptive data compression is possible. Though the contribution to total compression is less than that realized in obtaining the power density spectrum, significant compression is gained. Hardware requirements render this compression costly, however. Identification and buffering problems generally imply the use of a digital system. Finally, it is apparent that the only feasible data bandwidth compression system is one using band-type analyzers operating in the simple mode. (Author)

N66-33013 **Field 9F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TELEMETRY PROCESSING FOR NASA SCIENTIFIC SATELLITES.
by E. J. Habib, F. A. Keipert, and R. C. Lee. Aug 66, 17p NASA-TN-D-3411

Descriptors: *Data processing, *Nasa program, *Scientific satellite, *Telemetry, Data, Ogo, Orbiting geophysical observatory (ogo), Oso, Point, Processing, Rate, Satellite, Science, Technique.

For abstract, see STAR 04 19.

N66-33014 **Field 9F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AN ERROR DETECTION AND CORRECTION APPROACH TO THE TIME DECODING PROBLEM.
by A. M. Demmerle, T. J. Karras, and P. J. Mc ceney. Aug 66, 21p NASA-TN-D-3494

Descriptors: *Data processing, *Error detecting code, *Time factor, Code, Correction, Data, Decimal, Decoding, Detection, Error, Evaluation, Factor, Information, Processing, Reading, Redundancy, System, Time.

For abstract, see STAR 04 19.

N66-33366 **Field 9F**
CFSTI Prices HC$2.00 MF$0.50
Michigan Univ., Ann Arbor. Radiation Lab.
RADIATION OF AN ELEMENTARY CYLINDER ANTENNA THROUGH A SLOTTED ENCLOSURE.
by A. Olte. 1964, 43p NASA-CR-59898
Grant NSG-472
Submitted For Publication

Descriptors: *Cylindrical shell, *Radiation distribution, *Shrouded body, *Slotted antenna, Analysis, Antenna, Axial, Body, Concentric, Cylinder, Distribution, Radar, Radiation, Shell, Shroud, Slot, Waveguide.

For abstract, see STAR 04 19.

N66-33396 **Field 9F**
CFSTI Prices HC$2.00 MF$0.50
Texas Univ., Austin.
RADIO ASTRONOMY SIGNAL SPECTRUM ANALYSER.
by J. H. Sizelan. Sep 65, 36p NASA-CR-77009
Grant NSG-432

Descriptors: *Automatic data processing system, *Data storage, *Radio telescope, *Receiver, *Scanning device, Automatic, Composite, Data, Device, Processing, Radio, Sample, Scanning, Storage, Sum, System, Telescope.

For abstract, see STAR 04 19.

N66-33971 **Field 9F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMPARISON OF PERFORMANCE OF PCM AND PFM TELEMETRY SYSTEMS.
by C. J. Creveling. Aug 66, 14p NASA-TN-D-3476

Descriptors: *Communication system, *Pfm telemetry, *Pulse code modulation (pcm), Code, Communication, Comparison, Efficiency, Error, Modulation, Parameter, Pcm, Performance, Pfm, Power, Pulse, System, Telemetry.

For abstract, see STAR 04 19.

N66-33974 **Field 9F**
CFSTI Prices HC$2.00 MF$0.50
Computing Devices Of Canada, Ltd., Ottawa (Ontario).
HIGH SHOCK FM TRANSMITTER.
14 May 66, 46p NASA-CR-66161
Contract NAS1-5042
Its Rept.-7061/r1

Descriptors: *Electronic equipment, *Frequency modulation, *Mechanical drawing, *Transmitter, Assembly, Computation, Device, Drawing, Engineering, Frequency, Mechanical, Modulation, Photography, Shock, Specification.

For abstract, see STAR 04 19.

N66-38423 **Field 9F**
CFSTI Prices HC$2.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
FEASIBILITY BREADBOARD OF AN ALL-MAGNETIC PCM TELEMETRY SYSTEM.
by J. A. Baer, and C. H. Heckler Jr. Oct 66, 49p NASA-CR-624
Contract NAS1-3380

Descriptors: *Pulse code modulation (pcm), *Telemetry, Analog, Breadboard, Circuit, Conversion, Digital, Feasibility, Magnetic, Model.

For abstract, see STAR 04 23.

N66-38546 **Field 9F**
CFSTI Prices HC$3.00 MF$1.00
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-40, VOLUME III FOR THE PERIOD MAY 1, 1966 TO JUNE 30, 1966. THE DEEP SPACE NETWORK.
31 Jul 66, 127p NASA-CR-78436, JPL-SPS-37-40, VOL. III
Contract NAS7-100

Descriptors: *Antenna array, *Communication system, *Computer program, *Deep space instrumentation facility (dsif), *Radar tracking, Calibration, Clock, Data, Development, Engineering, Flight, Frequency control, Ground, High power, Mars, Maser, Microwave, Network, Operation, Pulse, Radio, Research, Signal, Spacecraft, Support, Transmission, Venus, X-band.

For abstract, see STAR 04 23.

N66-38711 **Field 9F**
CFSTI Prices HC$1.00 MF$0.50
Ohio State Univ., Columbus. Antenna Lab.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF SPACECRAFT ANTENNA PROBLEMS IN THE VARIED OPERATIONAL ENVIRONMENTS OF FAR-OUT-SPACE AND ATMOSPHERIC RE-ENTRY SEMIANNUAL REPORT, 1 JAN. - 31 JUL. 1966.
24 Jul 66, 9p NASA-CR-78473
Grant NSG-448

Descriptors: *Antenna, *Aperture, *Spacecraft reentry, Angle, Atmospheric, Entry, Environment, Incidence, Measurement, Operation, Problem, Reentry, Slab, Space, Spacecraft, Waveguide.

For abstract, see STAR 04 23.

N66-38787 **Field 9F**
CFSTI Prices HC$3.00 MF$0.75
Motorola, Inc., Scottsdale, Ariz. Government Electronics Div.
VEHICLE TRACKING RECEIVER DESIGN.
3 Aug 66, 76p NASA-CR-78591
Contract NAS8-11835
Its Rept.-3065-2-2

Descriptors: *Loop, *Phase lock, *Receiver, *Signal processing, *Tracking, Amplifier, Automatic, Carrier, Channel, Control, Design, Gain, Modulation, Performance, Vehicle.

For abstract, see STAR 04 23.

AD-463 240 **See Field 18C**

N66-33037 **See Field 20N**

10A. CONVERSION TECHNIQUES

AD-445 865 **Field 10A**
CFSTI Price: HC$5.60
Electrochemica Corp., Menlo Park, Calif. Research and Development Lab.
DIRECT AMMONIA-AIR FUEL CELL.
Quarterly rept. no. 3, 1 Jan-1 Apr 64,
by M. Eisenberg, and K. E. Kuppinger. 1 Apr 64, 55p
Contract DA-36-039-AMC-03245 (E)
Task 1G6-22001-A-05304

Descriptors: (*Fuel cells, Ammonia), (*Ammonia, Fuel cells), Electrochemistry, Electrolytes, Alkali metal compounds, Hydroxides, Catalysts, Platinum, Palladium, Nickel, Water, Electrodes, Oxidation, Aging (Materials), Reaction kinetics, Air, Gaskets, Seals (Stoppers), Statistical analysis.

Performance studies were conducted extensively on direct ammonia fuel cells. Two new types of catalysts were studied and compared with platinum black. Gasketing problems and a new cell structure are discussed. Further improvements in techniques involved in making a complete material balance are described. Results of studies of formation of traces of nitrates and nitrites by chemical side reaction are discussed. Kinetics of the anodic oxidation of ammonia were analyzed theoretically and experimentally investigated in a special apparatus to determine the nature of the controlling step. Results indicate that oxidation of the intermediate metal-amine absorbed species is rate controlling. Theoretical and practical considerations of the water balance and transport problems are discussed. (Author)

N66-33388 **Field 10A**
CFSTI Prices HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. Of Engineering.
PHOTOVOLTAIC EFFECT AND UTILIZATION OF PHOTOVOLTAIC CELLS - EFFECT OF SUBTHRESHOLD ELECTRON RADIATION ON SURFACE PROPERTIES OF GE P-V CELLS SECOND SEMIANNUAL REPORT, 1 NOV. 1965 - 31 MAY 1966.
by W. Giriat, I. Kasai, and J. J. Loferski. Jun 66, 32p NASA-CR-77042
Contract NGR-40-002-026

Descriptors: *Atomic recombination, *Electron radiation, *Germanium, *P-n junction, *Photovoltaic cell, *Surface reaction, Atom, Cell, Effect, Electron, High energy, Impurity, Photovoltaic, Property, Radiation, Reaction, Recombination, Resistance, Surface.

For abstract, see STAR 04 19.

N66-33403 **Field 10A**
CFSTI Prices HC$1.00 MF$0.50
Rice Univ., Houston, Tex. Dept. Of Electrical Engineering.
A DISTRIBUTED PARAMETERS MODEL FOR SOLAR CELLS.
by G. C. Jain, and F. M. Stuber. 1966, 22p
NASA-CR-77027
Grant NSG-6

Descriptors: *Mathematical model, *Shunt, *Solar cell, Cell, Differential, Distribution, Element, Equation, Grid, Mathematics, Model, Optimum, Path, Resistance, Series, Solar.

For abstract, see STAR 04 19.

N66-37674 **Field 10A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMAL CYCLING OF THIN-FILM CADMIUM SULFIDE SOLAR CELLS.
by J. G. Ewashinka, and A. E. Spakowski. Oct 66, 22p NASA-TN-D-3556

Descriptors: *Cadmium sulfide, *Solar cell, *Thermal cycling, *Thin film, Barrier, Grid, Light, Plastic, Pressure, Source, Substrate, Surface, Vacuum, Xenon.

For abstract, see STAR 04 23.

N66-38490 **Field 10A**
CFSTI Prices HC$2.50 MF$0.50
American Cyanamid Co., Stamford, Conn.
DEVELOPMENT OF HIGH-PERFORMANCE LIGHT-WEIGHT ELECTRODES FOR HYDROGEN-OXYGEN FUEL CELLS FOURTH QUARTERLY REPORT, 6 JAN. - 5 APR. 1966.
by W. P. Colman, J. Di palma, and D. Gershberg. 15 Oct 66, 55p NASA-CR-72092
Contract NAS3-6477

Descriptors: *Electrode, *Hydrox fuel cell, *Test program, Cell, Development, Fuel, High performance, Hydrogen, Large, Life, Lightweight, Oxygen, Pressure, Resistance, Small, Voltage.

For abstract, see STAR 04 23.

N66-38759 **Field 10A**
CFSTI Prices HC$3.00 MF$0.75
Trw Systems, Redondo Beach, Calif. Physical Electronics Lab.
RESEARCH ON ION BEAM DIAGNOSTICS FINAL REPORT.
by R. F. Kemp, and J. M. Sellen Jr. 10 Feb 66, 113p
NASA-CR-54692, TRW-4381-6017-RO-000
Contract NAS3-6276

Descriptors: *Electron emission, *Ion beam, *Plasma physics, Acceleration, Cell, Cesium, Device, Diagnostics, Discharge, Drag, Electric, Electron, Field, Impeller, Interaction, Ion, Mercury, Neutralizer, Probe, Property, Research, Solar, Stream, Thrust.

For abstract, see STAR 04 23.

PB-173 382 **Field 10A, 20C**
CFSTI Prices: HC$3.00 MF$0.75
Cómmissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CONTRIBUTION A L'ETUDE SUR UN NOUVEL EFFET DE CONVERSION D'ENERGIE IONISANTE EN ELECTRICITE (Contribution to the Study of a New Ionising-Energy Conversion Effect in Electricity).
Doctoral thesis in French,
by Mohammad Rahim Ahrabi. Nov 65, 61p
CEA-R-2974
Text in French; attached summary in English.

Descriptors: (*Gas ionization, *Energy conversion), Electrodes, Electrical discharges, Gases, Vapors, Temperature, France.

When two identical electrodes at different temperatures are placed in a vapour or in a condensible ionized gas, an electromotive force is produced between the two electrodes. The potential differences obtained are too great to be attributed merely to a thermocouple effect, and the electromotive forces observed are of a quite different order of magnitude from those obtained theoretically using conventional hypotheses. (Author)

AD-445 787 **See Field 7D**

AD-454 676 **See Field 21D**

AD-641 304 **See Field 10B**

10B. POWER SOURCES

AD-286 698 **Field 10B, 7D, 11F**
CFSTI Price: HC$10.60
Douglas Aircraft Co., Inc., Newport Beach, Calif.
FUEL CELL CATHODE STRUCTURES AND REACTIONS,
by William A. Cannon, and Levy-Pascal A. Ehud. Sep 62, 104p Rept. no. 102-F
Contract DA-49-186-ORD-1036

Descriptors: (*Cathodes (Electrolytic cell), Electrodes), (*Fuel cells, *Power supplies), Adsorption, Electrochemistry, Films, Hydrogen compounds, Impurities, Krypton, Manufacturing methods, Metals, Nickel, Nickel compounds, Oxides, Peroxides, Platinum, Polarization, Preparation, Structures, Surface area, Surfaces, Theory, Xenon.

A correlation of physical characteristics of metallic surfaces with their electrochemical behavior as O cathodes was undertaken to gain an understanding of the mode of function of specific metallic electrodes in the low temperature range. Preparation of N1 and PT electrodes are described. The results of surface characterization, including surface purity and grain size, are presented. The methods used for preparing plain and doped nickel oxide films on the surfaces of nickel (such as vapor deposition and surface oxidation) are described. The importance of this oxide film as a decisive factor in electrode behavior is explained. The background and techniques used in obtaining gas adsorption isotherms are given. The theory behind the studies of electrode polarization, charging curves, and double layer capacitance is given, followed by the data obtained in measurement of these functions for N1, nickel oxide, and PT electrodes. Correlations provide a basis for understanding the factors operative in high performance low temperature fuel cell cathodes. (Author)

AD-641 304 **Field 10B, 13M, 10A, 9A**
CFSTI Price: MF$0.75
Bureau of Reclamation, Denver, Colo. Office of Chief Engineer.
ANNOTATED BIBLIOGRAPHY OF BRATSK AND KRASNOIARSK HYDROELECTRIC PROJECTS IN CENTRAL SIBERIA, USSR,
by Anne W. Sands. Sep 66, 107p Bibliography-244
TT-66-62544
Availability: Hard copy available from Bureau of Reclamation, Office of Engineering Reference Library Branch, Denver, Colo. $2.00.

Descriptors: (*Power plants (Establishments), USSR), (*Bibliographies, Power plants (Establishments)), Dams, Electric power production, Turbines, Concrete, Generators, Welding, Metallurgy, Electrical equipment.

This annotated bibliography contains 352 references to books, monographs, pamphlets, and articles, largely from Soviet sources, on these 2 Siberian multiple-purpose projects being completed by Soviet constructors. The scope of the projects, size of the equipment being installed, and construction problems faced in an undeveloped taiga region with a severe climate make these projects of interest to American engineers. The USSR is understandably proud of its accomplishments and much has been written describing them. Soviet engineers have reported in detail the experience gained from the design, construction, and research problems and solutions as a basis for future construction of similar projects in Siberia. No effort has been made to evaluate the references, for the difference is usually one of attitude and not accuracy, and each contains some valuable or interesting information. The references are divided under these headings: General; Reservoirs and Dams; Powerplants; Turbines and Penstocks; Generators, Electrical Equipment, and Transmission Systems; Construction Materials and Equipment; and Welding and Metallurgy. They are relisted under headings of Bratsk and Krasnoiarsk by number, referring to the reference in the initial main category. Conversion nomographs, abbreviations and acronyms, and a list of Soviet technical periodicals are included under miscellaneous aids.

AD-641 412 **Field 10B, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Pratt and Whitney Aircraft, East Hartford, Conn.
INVESTIGATION OF MECHANISMS FOR ELECTROCHEMICAL CATALYSIS.
Quarterly technical rept. no. 1, 1 May-31 Jul 66, by John R. Aylward, and Stanley W. Smith. Nov 66, 32p PWA-2911
Contract DA-28-043-AMC-02205 (E)
Proj. DA-1C014501A34A00
Task 11
ECOM-02205-1

Descriptors: (*Silicides, Catalysis), (*Fuel cells, Catalysis), (*Catalysis, Electrochemistry), Oxidation, Electrolytes, Catalysts, Polarization, Corrosion, Hydrogen, Methanols, Oxides, Films, Electrical conductance.

A program is being conducted to investigate the mechanisms of electrocatalysis with respect to the anodic oxidation of selected fuels by novel electrocatalysts in acid electrolyte at temperatures below 150C and at ambient pressure. The transition-metal silicides were chosen for study on the basis of previous work which indicated some catalytic activity for these materials for fuel oxidation. The electrochemical properties of the silicides in acid electrolyte were investigated by measuring the polarization behavior using both potential sweep and steady-state methods. Tests were performed in inert-gas saturated electrolyte to determine corrosion resistance and characteristics of oxide film formation, and then in hydrogen-saturated electrolyte or in electrolyte which is 0.1 molar in methanol to evaluate the catalytic activity. The results showed that the corrosion current for these materials in acid electrolyte is low, generally about 0.00001 amp/sq cm. The oxide films formed on the silicides are good electronic conductors and form through a reversible process. The silicides by themselves were found to have no significant activity for the electrochemical oxidation of hydrogen or methanol, but, when combined with trace amounts of platinum, they demonstrated considerable activity. (Author)

AD-641 432 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
Thermo Electron Engineering Corp., Waltham, Mass.
OPTIMUM ELECTRODE CAVITIES FOR THERMIONIC ENERGY CONVERTERS.
Final rept. 1 Aug 64-31 Jul 66, by F. Rufeh, S. S. Kitrilakis, and D. Lieb. 31 Aug 66, 89p TE-15-67
Contract AF 19 (628)-4322
Proj. AF-8659
Task 865902
AFCRL-66-683

Descriptors: (*Thermionic converters, Diodes), Cesium electron tubes, Ions, Design, Diffusion, Experimental data, Cesium, Plasma medium, Performance (Engineering).

The diffusion coefficient of cesium ions in cesium plasma and the reflection coefficient of the ions from the plasma boundaries were measured using a three-collector thermionic diode. Based on these transport parameters, a cavity-collector diode was designed and constructed. The experimental data from this system indicates that the ions generated in the cavities diffuse to the surrounding regions and neutralize the electron space charge. This result is important to thermionic conversion since it shows the possibility of reducing electron scattering and the internal voltage drop needed for volume ionization. (Author)

N66-32943 **Field 10B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A DESIGN PROCEDURE FOR THE WEIGHT OPTIMIZATION OF STRAIGHT FINNED RADIATORS.
by R. J. Burian, D. W. Harris, and J. J. Ketchman. Aug 66, 30p NASA-TN-D-3489

Descriptors: *Optimization, *Power generator, *Space radiator, *Weight analysis, Analysis, Design, Fin, Generator, Heat, Power, Procedure, Radiator, Rejection, Space, Waste, Weight.

For abstract, see STAR 04 19.

N66-33975 **Field 10B**
CFSTI Prices HC$5.54 MF$2.50
General Electric Co., Cincinnati, Ohio. Space Power And Propulsion Section.
RANKINE CYCLE TEST FACILITY STUDY - TECHNICAL DATA FINAL REPORT.
by R. H. Wettach. Aug 66, 505p NASA-CR-54972
Contract NASW-943

Descriptors: *Closed loop system, *Liquid metal, *Rankine cycle, *Test facility, Chamber, Closed, Construction, Facility, Instrumentation, Liquid, Lithium, Loop, Metal, Potassium, Power, Preliminary, Requirement, Scheduling, Study, System, Test, Vacuum.

For abstract, see STAR 04 19.

N66-38418 **Field 10B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPARISON OF CALCULATED AND MEASURED CHARACTERISTICS OF HORIZONTAL MULTITUBE HEAT EXCHANGER WITH STEAM CONDENSING INSIDE TUBES.
by H. H. Coe, D. B. Fenn, and O. A. Gutierrez. Oct 66, 50p NASA-TN-D-3670
Contract 120-27-04-02-22

Descriptors: *Rankine cycle, *Tube heat exchanger, *Turbogenerator, Condensation, Electric, Fluid, Heat transfer, Power, Shell, Space, Steam, System, Water, Working.

For abstract, see STAR 04 23.

AD-641 363 **See Field 20L**

PB-173 501 **See Field 9C**

10C. ENERGY STORAGE

AD-456 849 **Field 10C**
CFSTI Price: HC$9.60
Edison (Thomas A.) Industries, Bloomfield, N. J. Primary Battery Div.
AUXILIARY ELECTRODE FOR CHARGE CONTROL OF SEALED NICKEL-CADMIUM BATTERIES.
Quarterly progress rept. no. 1, 15 Jun-14 Sep 64, by Philip F. Grieger. 14 Sep 64, 93p
Contract DA-28-043-AMC-00152 (E)
Proj. DA-1C6-22001-A053-02

Descriptors: (*Batteries + components, *Electrodes), (*Storage batteries, *Battery chargers), Control, Nickel, Cadmium, Alkaline cells, Hermetic seals.

Identifiers: Nickel-cadmium cells.

Twelve auxiliary electrode materials made by electroplating four kinds of carbonized cloth and platinum screen and foil with Grey or Black platinum were tested as O2 reduction electrodes in 0.5 to 2 atmospheresO02 at room temperature and-40F. Type of platinum and substrate are significant (analysis of variance) in determining performance; there is a sizable replication error with the evaluation method used. Black and Grey on VCB carbon cloth, and Black on WCB graphite cloth are good and the best of those tested. VCB Black probably can be used even at -40F. It is unlikely that electrochemical oxidation causes deterioration of the carbons. H2 evolution potential measurements in the absence of O2 indicate H2 evolution during the early stages of charging may be a problem; there was little difference between Grey and Black except on platinum foil. A commercial sealed Ni/Cd cell (thin plates) was tested (using can expansion as pressure indication) to determine charge acceptance at rates up to 5C at room temperature, 120 and 0F.

AD-458 044 **Field 10C**
CFSTI Price: HC$3.00
Edison (Thomas A.) Industries, Bloomfield, N. J. Primary Battery Div.
AUXILIARY ELECTRODE FOR CHARGE CONTROL OF SEALED NICKEL-CADMIUM BATTERIES.
Quarterly progress rept. no. 2, 15 Sep-14 Dec 64, by Philip F. Grieger. 14 Dec 64, 79p
Contract DA-28-043-AMC-00152 (E)
Proj. DA-1P6-22001-A-053-02

Descriptors: (*Batteries + components, Electrodes), (*Electrodes, Batteries + components), Hydrogen, Oxygen, Nickel, Cadmium, Metallic textiles, Platinum, Hermetic seals, Polarization, Voltage, Diodes.

H2 evolution potential (N2 atmosphere) for unplatinized carbonized cloths and charging potential of a cadmium plate were determined. Using these and charge acceptance data previously obtained for a sealed cell, volume of H2 evolved before onset of O2 evolution was estimated for various cell charging rates up to 5C and found to be small; but analogous estimates indicate platinized cloths require a diode and/or resistance (possibly supplemental to that already present) in the signaling circuit. Unplatinized cloths when retested for O2 reduction performed more poorly but both tests are suspect. Thirty pieces of VCB Grey, VCB or WCB Black were plated from a given bath: weight of Pt deposited and O2 reduction performance were independent of order plated, but performance was much less than previously observed--probably mainly because too much electrolyte was present. (Author)

AD-641 660 **Field 10C**
CFSTI Prices: HC$2.00 MF$0.50
Burgess Battery Co., Freeport, Ill.

DEVELOPMENT OF MAGNESIUM WAFER CELLS.
Quarterly technical rept. no. 1, 1 May-31 Jul 66,
by Timothy S. Hungate. Oct 66, 34p
Contract DA-28-043-AMC-02135 (E)
Proj. DA-1C6-22001-A053
Task 02
ECOM-02135-1

Descriptors: (*Primary cells, *Magnesium), (*Dry cells, Magnesium), Batteries + components, Storage, Thermal stability, Performance (Engineering), Construction, Magnesium alloys, Electrical properties, Anodes (Electrolytic cell).

Identifiers: Magnesium alloy AZ21, Magnesium wafer cells.

The purpose of this development contract is to design a practical magnesium wafer battery which performs satisfactorily after storage for various periods at ambient temperatures up to 160F. The initial phase of development includes the design of a cell and the resulting battery systems which perform reliably after being subjected to storage at 70F and 113F. Batteries are being constructed using both eight and nine cells in a series. Discharge results indicate it is possible to reproducibly build nine cell batteries and predict their performance after storage at 70F and 113F. Capacity results after storage at 130F are erratic and, for all practical purposes, there is no performance after storage at 160F. (Author)

AD-641 852 **Field 10C**
CFSTI Prices: HC$3.00 MF$0.75
Bright Star Industries, Clifton, N. J.
ORGANIC DEPOLARIZED CELLS UTILIZING META-DINITROBENZENE.
Progress rept. no. 2, 15 Sep 65-30 Jun 66,
by Sol S. Jaffe. Oct 66, 94p
Contract DA-28-043-AMC-01401 (E)
Proj. DA-1C6-22001-A-053
Task 1C6-22001-A-053-02-09
ECOM-01401-2

Descriptors: (*Batteries + components, Manufacturing methods), (*Dry cells, Manufacturing methods), (*Nitrobenzenes, Batteries + components), Magnesium, Magnesium compounds, Perchlorates, Battery separators, Organic materials, Carbon black, Sealing compounds, Permeability, Processing, Construction, Electrical properties.

Identifiers: Depolarizers (Electrical), Dinitrobenzenes, Organic batteries.

The fabrication of 'A' size cylindrical magnesium/magnesium perchlorate/m-dinitrobenzene cells was carried out within the framework of a fractional factorial experiment designed to explore and optimize several composition and design variables. The results indicate that cells giving an average of at least 26.8 hours of output (to 0.90 volt, through 16 2/3 ohms) can be built.

N66-37685 **Field 10C**
CFSTI Prices HC$2.50 MF$0.75
Livingston Electronic Corp., Montgomeryville, Pa.
DEVELOPMENT OF HIGH ENERGY DENSITY PRIMARY BATTERIES FOURTH QUARTERLY REPORT, 22 MAR. - 21 JUN. 1966.
by S. G. Abens, R. Corbett, and W. C. Merz.
1966, 53p NASA-CR-72071
Contract NAS3-7632

Descriptors: *Copper fluoride, *Electric cell, *Energy density, *Space flight, Battery, Carbonate, Cell, Discharge, Electrode, Electrolyte, Formate, High energy, Life, Lithium, Methyl, Perchlorate, Positive, Primary, Propylene, Shelf, Solubility, System, Wetness.

For abstract, see STAR 04 23.

N66-37800 **Field 10C**
CFSTI Prices HC$2.50 MF$0.50
General Electric Co., Gainesville, Fla. Battery Business Section.
DEVELOPMENT OF IMPROVED CADMIUM ELECTRODES FOR SEALED SECONDARY BATTERIES FINAL REPORT.
by H. H. Kroger. 17 Aug 66, 51p NASA-CR-72084
Contract NAS3-7636

Descriptors: *Electrode, *Nickel-cadmium battery, Battery, Behavior, Design, Discharge, Electrochemical, Fiber, Material, Powder, Rate, Sealing, Secondary, Separator, Sintering.

For abstract, see STAR 04 23.

N66-38706 **Field 10C**
CFSTI Prices HC$1.00 MF$0.50
Sonotone Corp., Elmsford, N. Y. Battery Div.
PROCUREMENT AND DEVELOPMENT PROGRAM FOR NICKEL-CADMIUM CELLS TO SPECIFICATION S-615-P-2 TECHNICAL STATUS REPORT NO. 12, MAY 25 - AUG. 26, 1966.
by G. A. Baumstark. 1966, 23p NASA-CR-78517
Contract NAS5-9226

Descriptors: *Nickel-cadmium battery, *Test program, Battery, Cadmium, Cell, Ceramic, Development, Electrolyte, Glass, Nickel, Overcharge, Pressure, Procurement, Program, Seal, Testing, Transducer, Voltage.

For abstract, see STAR 04 23.

N66-38788 **Field 10C**
CFSTI Prices HC$5.00 MF$1.25
Naval Ammunition Depot, Crane, Ind.
SPACE CELL TEST PROGRAM MONTHLY PROGRESS REPORT, 31 JUL. 1966.
by C. M. Austin, and E. R. Pettebone. 1966, 174p NASA-CR-78594
NASA ORDER W-11252B

Descriptors: *Energy storage device, *Nickel-cadmium battery, *Silver-cadmium battery, Analysis, Battery, Cell, Cycle, Failure, Life, Silver, Space, Test, Zinc.

For abstract, see STAR 04 23.

11A. ADHESIVES AND SEALS

AD-460 741 **Field 11A**
CFSTI Price: HC$4.00
Marine Engineering Lab., Annapolis, Md.
AN ANALYTICAL STUDY OF THIN FLUID FILMS IN FACETYPE SHAFT SEALS.
Master's thesis,
by Ralph B. Snapp. Jul 62, 133p

Descriptors: (*Hydraulic seals, Thrust bearings), (*Films, Hydraulic seals), Mathematical analysis, Equations, Pressure, Force (Mechanics), Thickness, Centrifugal fields, Elasticity, Deformation, Graphics, Parabolic bodies, Surface properties, Design, Performance (Engineering), Digital computers, Propellers (Marine), Shaft couplings, Carbon, Water.

An analytical study of thin fluid films between the sealing surfaces of face-type seals is presented for parallel. Linear converging, linear diverging, and three types of parabolic faces, equations are developed to analyze the effect of these contours on pressure profile, fluid force at seal face; film thickness, and leakage rate, centrifugal effect of the fluid film is included in the analyses as well as elastic deformation of the sealing surface in both radial and axial directions. Equations are also developed for including film thickness variations in the tangential direction. Graphic comparisons of numerical solutions to the equations are presented for the various cases analyzed. (Author)

AD-641 872 **Field 11A, 7C, 11I**
CFSTI Prices: HC$2.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Plastics and Packaging Lab.
EXPLORATION OF THE FEASIBILITY OF PREPARING DOUBLE CHAIN NOVOLAC RESINS.
Technical rept.,
by E. A. Hoess, and W. C. Tanner. Oct 66, 30p
Proj. DA-1C024401A329
PA-TR-3346

Descriptors: (*Adhesives, Phenolic plastics), (*Phenolic plastics, Preparation), Synthesis (Chemistry), Phenols, Polycyclic compounds, Molecular structure, Solubility, Condensation reactions, Gels.

Identifiers: Bisphenols.

Soluble novolac resins were prepared by means of a snythetic scheme devised to yield double chain novolac resins from polyhydric polynuclear phenols. The bisphenols were the only polyhydric phenols which gave soluble polymers. Further work will be needed to determine whether the polymers obtained are ordered networks or soluble micro gels. (Author)

N66-33493 **Field 11A**
CFSTI Prices HC$2.00 MF$0.50
General Precision, Inc., Little Falls, N. J. Research Center.
HIGH TEMPERATURE STABLE CARBORANE ADHESIVES SECOND QUARTERLY PROGRESS REPORT, MAR. 21 - JUN. 20, 1966.
by R. Barnes. 20 Jun 66, 28p NASA-CR-65448
Contract NAS9-5527

Descriptors: *Aerospace technology, *Epoxy resin, *High temperature material, *Polymer chemistry, *Synthesis, Adhesive, Aerospace, Carborane, Chemistry, Epoxy, High temperature, Intermediate, Material, Monomer, Polymer, Resin, Technology, Temperature.

For abstract, see STAR 04 19.

11B. CERAMICS, REFRACTORIES, AND GLASSES

AD-641 324 **Field 11B, 20B**
CFSTI Prices: HC$3.00 MF$0.50
Harvard Univ., Cambridge, Mass. Div of Engineering and Applied Physics.
THE EFFECT OF HIGH PRESSURE ON B203: CRYSTALLIZATION, DENSIFICATION, AND THE CRYSTALLIZATION ANOMALY.
Technical rept.,
by D. R. Uhlmann, J. F. Hays, and D. Turnbull.
Jul 66, 54p TR-8
Contract Nonr-1866 (50)
Proj. NR-032-485

Descriptors: (*Boron compounds, High-pressure research), (*Crystallization, Boron compounds), Oxides, Density, Glass, Phase studies, Water, Theory, Thermochemistry.

Identifiers: Boron oxide.

The crystallization and densification of B2O3 at high pressure were investigated using a Bridgman anvil device. Crystallization was observed at pressures as low as 4 kilobars and at temperatures as low as 210C. A marked effect of water in increasing the overall crystallization rate, and the increase in this rate with increasing temperature, were demonstrated. Increases in density as large as 17 per cent, and a strong effect of temperature in increasing densification, were likewise shown. The crys-

tallization behavior is discussed in terms of the kinetic formalism developed previously and is related to past observations on SiO2 at high pressure. The densification results are considered in light of the results of others workers on B2O3 and SiO2. The anomalous crystallization behavior of B2O3 is discussed, and a number of hypotheses are advanced to explain the observations. These hypotheses are evaluated in relation to the results of the high pressure study. (Author)

AD-641 500 **Field 11B, 11D**
CFSTI Prices: HC$3.00 MF$0.75
State Univ. of New York, Stony Brook. Dept. of Materials Sciences.
MECHANISMS OF ATTACK ON GLASSES IN AQUEOUS MEDIA.
Interim scientific rept., 1 Jun-20 Sep 66,
by Sumner N. Levine, and William C. LaCourse.
20 Sep 66, 70p
Contract Nonr-4803 (00)

Descriptors: (*Glass textiles, Surface properties), Etching, Acids, Microstructure, Phase studies, Chemical reactions, Silicon compounds, Boron compounds, Oxides, Corrosion, Composite materials.

As part of a program concerned with the influence of surface properties of glass on the behavior of reinforced plastics, we report here on an electron microscope study of aqueous attack on glass. Micrographs of E and 994 glasses, treated in solution of pH 2 through 11, are shown and a discussion of these micrographs is given. The effects of large scale phase separation in these glasses are discussed and plausible mechanisms for aqueous attack on these glasses are given. A detailed discussion of glass structure and a survey of earlier work on chemical attack is given in the introduction. An alternative approach to the boric oxide anomaly is also suggested. (Author)

AD-641 657 **Field 11B, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Metallurgy and Materials Science.
THE FRACTURE TOUGHNESS OF IMPURE MgO CRYSTALS.
Technical rept.,
by G. W. Groves, and D. A. Shockey. Nov 66, 26p TR-2
Contract Nonr-760 (29)
Proj. RR-007-02-01

Descriptors: (*Ceramic materials, Fracture (Mechanics)), (*Magnesium compounds, Oxides), Microstructure, Toughness, Crystals, Doping, Titanium.

Identifiers: Magnium oxide.

When cracks are propagated through impure MgO crystals in a series of small jumps, the force needed to initiate successive jumps decreases as the crack grows in the manner predicted by a Griffith energy balance, in which an effective, or fracture surface energy is substituted for the true surface energy of the crystal. Fracture surface energies in the range 1000 to 3000 ergs/sq cm are obtained. Examination of the fracture surfaces shows that many dislocations are introduced by the crack as it comes to the end of a jump. The measured fracture surface energy represents the release of elastic energy which is needed to re-start a crack from a plastically deformed configuration. When the crack divides the crystal into unequal instead of equal parts, a different pattern of slip occurs at its tip, which leads to a higher fracture surface energy. (Author)

AD-641 911 **Field 11B, 8G, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Materials Research Lab.
RELATION OF MECHANICAL PROPERTIES TO THE STRUCTURE OF IONIC SOLIDS.
Quarterly rept. no. 1, 1 Jun-31 Aug 66,
by K. Vedam, and V. Vand. 14 Sep 66, 41p
Contract DA-19-066-AMC-325 (X)
AMRA-CR-66-07/1

Descriptors: (*Mica, Crystal structure), (*Ceramic materials, Ductility), Mechanical properties, Crystal growth, Synthesis (Chemistry), Bibliographies.

The primary objective of this project is to strive towards the goal of an ideal ductile ceramic (i) by carrying out investigations on the various mechanical properties of different mica species (ii) by determining the crystal structure of some of these selected micas and correlating the results with their mechanical properties and (iii) by tailor-making suitable materials from a knowledge of the mechanism responsible for the unique mechanical properties of mica. An extensive bibliography on the various physical properties of mica and its synthesis and crystal growth is included. (Author)

N66-33185 **Field 11B**
CFSTI Prices HC$1.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Interdisciplinary Materials Research Center.
IDENTIFICATION OF UNCOMMON NON-CRYSTALLINE SOLIDS AS "REA" GLASSES.
by J. D. Mackenzie, and D. R. Secrist. 1964, 24p
NASA-CR-59933
Grant NSG-100-60
Submitted For Publication

Descriptors: *Glass, *Physical property, Absorption, Alloy, Aluminum, Amorphous, Compound, Crystallization, Density, Fluoride, Gold, Identification, Index, Infrared, Kinetics, Magnesium, Physical, Property, Refraction, Silicon, Solid.

For abstract, see STAR 04 19.

PB-173 488 **Field 11B, 13C, 13B**
CFSTI Prices: HC$3.00 MF$0.75
New York State Dept. of Public Works.
THE INFLUENCE OF NATURAL SAND FINE AGGREGATE ON SOME OF THE PROPERTIES OF HARDENED CONCRETE MORTAR.
Research rept.,
by W. P. Chamberlin. Dec 65, 73p RR-65-10, 0342
Proj. 9
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, Physical properties), (*Sand, Concrete), Test methods, Freezing, Thermal expansion, Deformation, Fracture (Mechanics), Modulus of elasticity, Moisture, Environmental tests, Clay, Roads, New York.

Identifiers: Aggregates (Materials).

The report summarizes a laboratory study of twenty-five natural sands and the effect that variations in their characteristics have on the freeze-thaw durability, drying shrinkage and water requirement of concrete mortar. It was shown that except for the possibility of slight surface damage in the form of small pits or 'popouts,' even extremely poor quality fine aggregate will cause no freeze-thaw deterioration of air entrained concrete. Variations in sands, however, were associated with significant variations in mortar shrinkage and water requirement. The effective modulus of elasticity of the sands was found to correlate to a high degree with mortar shrinkage. The outstanding fact concluded from this research is that results of the sulfate salt soundness test bear little relationship to the effect of fine aggregate, per se, on the frost resistance of concrete. Such results, however, do correlate to a high degree with two very significant properties, modulus of elasticity and water requirement. It was also concluded that the measures of 'quartz and feldspar' and 'kaolin' of the New York rational analysis are less precise indicators of quality than sulfate salt soundness.

AD-451 684 **See Field 11I**

AD-641 653 **See Field 20K**

AD-641 790 **See Field 20C**

AD-641 875 **See Field 13J**

11C. COATINGS, COLORANTS, AND FINISHES

AD-641 649 **See Field 20K**

AD-641 932 **See Field 11F**

N66-38087 **See Field 18G**

11D. COMPOSITE MATERIALS

N66-33464 **Field 11D**
CFSTI Prices HC$3.00 MF$0.75
Debell And Richardson, Inc., Hazardville, Conn.
INITIATION OF FAILURE MECHANISMS IN GLASS- RESIN COMPOSITES.
by W. J. Eakins. Aug 66, 70p NASA-CR-518
Contract NASW-1100

Descriptors: *Composite material, *Failure, *Glass, *Resin, *Strain gauge, Casting, Composite, Crack, Gauge, Material, Measurement, Photoelasticity, Propagation, Shrinkage, Strain, Stress.

For abstract, see STAR 04 19.

AD-451 684 **See Field 11I**

AD-641 500 **See Field 11B**

11E. FIBERS AND TEXTILES

AD-641 433 **Field 11E, 19D**
CFSTI Prices: HC$4.00 MF$0.75
Denver Research Inst., Colo.
RESPONSE ON NON-WOVEN SYNTHETIC FIBER TEXTILES TO BALLISTIC IMPACT.
Final rept. Jul 63-Oct 65,
by Thomas W. Ipson, and Edward P. Wittrock.
Jul 66, 125p
Contract DA-19-129-AMC-157 (N)
Proj. DA-1K024401A113
USA-NLABS-TR-67-8-CM, C/OM-TS-142

Descriptors: (*Textiles, Impact shock), Shock resistance, Fibers (Synthetic), Velocity, Penetration, Projectiles.

The objective of this program was to define the transient behavior of the felt and the force interaction between it and the projectile. Six felt samples (nylon (3), orlon, dacron, polyproplylene) were tested using the 17-grain fragment simulating projectile at various velocities up to and greater than the ballistic limit velocity. Graphical differentiation was used to obtain velocity-time, force-time, and force-distance relationships. Qualitative evaluations reveal that strength, elongation, and transverse wave velocity are the three predominant parameters in determining effectiveness. The energy absorbed by a felt is maximum at the ballistic limit velocity and decreases dramatically at higher (complete perforation) velocities. An analytical model based upon momentum considerations is compared to the experimental results. (Author)

AD-641 496 **Field 11E**
CFSTI Prices: HC$4.00 MF$0.75
Clothing and Organic Materials Div., Army Natick Labs., Mass.
POINT SYSTEM FOR EVALUATING QUALITY IN TEXTILES.
Technical rept.,

by Harold J. McIsaac. Oct 66, 116p C/OM-TS-146
USA-NLABS-TR-67-29-CM

Descriptors: (*Textiles, Quality control), (*Quality control, Standardization), (*Military requirements, Textiles), Armed forces procurement, Textile industry, Sampling, Clothing.

The major and minor evaluation system used to establish the quality of fabric required by the Government was never totally understood by the textile industry. The reason, apparently, was poor communication between the supplier and the purchasers as to desired quality. This evaluation system was different from the many quality analyses used for commercial fabrics. It was realized that a standard method of evaluating quality of fabric that would be agreeable to both the textile industry and the Government was needed. The 'point system' was proposed as the standard method of evaluating quality of fabrics and was discussed at three Industry Advisory Committee meetings. Various tests were run. Results of inspections conducted by the industry were compared with results of verification inspections. Areas of difference were resolved. In 1961 the Government and the industry adopted a standard method of defining and scoring defects, thereby assuring that goods delivered on contracts were of the quality stipulated as acceptable by the specification. The first mass procurement of 26 million yards of carded sateen, employing the point system method of evaluating defects, was extremely successful. The point system is simple, easily understood, and has been hailed by the textile industry as the necessary bridge in the communication of quality required by the Government. (Author)

11F. METALLURGY AND METALLOGRAPHY

AD-462 843 **Field 11F, 20K**
CFSTI Price: HC$1.00
Battelle Memorial Inst., Columbus, Ohio.
STRUCTURAL CHANGES IN HIGH-STRENGTH STEEL ASSOCIATED WITH STRESS CORROSION AND ITS RELATIONSHIP TO DELAYED FAILURE.
Quarterly progress rept. no. 2, 28 Sep-28 Dec 64,
by D. I. Phalen, D. A. Vaughan, A. B. Tripler, W. K. Boyd, and C. M. Schwartz. 27 Jan 65, 25p
Contract NOw-64-0267-c
Proj. WR-007-05-01

Descriptors: (*Steel, Transformations), (*Stresses, Corrosion), Fractography, Hydrogen embrittlement, Crystal structure, Microstructure, Metallography, X-ray diffraction analysis, Surface properties, Heat treatment, Grain structures (Metallurgy), Fracture (Mechanics), Electron miscroscopy, Austenite, Martensite, Grain boundary, Crystal lattice defects, Hydrogen, Ductility, Brittleness, Failure (Mechanics).

Microscopic and crystal-structure examinations have been made on AISI 4340 steel heat treated to four strength levels, to provide a basis for investigating changes in these materials during stress-corrosion cracking and hydrogen embrittlement. Preliminary studies on stress-corrosion fracture surface reveal two, and possibly three, morphological characteristics that coincide with specific areas in the fracture. Metal-hydrogen reactions that have been studied suggest different behavior for martensite and ferrite. The net result of the metal-hydrogen reaction was found to be an induced compressive stress in the surface. (Author)

AD-468 171 **Field 11F, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
STRUCTURAL CHANGES IN HIGH-STRENGTH STEEL ASSOCIATED WITH STRESS CORROSION AND ITS RELATIONSHIP TO DELAYED FAILURE.
Summary research rept., 29 Jun 64-29 Jun 65,
by D. I. Phalen, D. A. Vaughan, A. B. Tripler, Jr., W. K. Boyd, and C. M. Schwartz. Jul 65, 23p
Contract NOw-64-0267-c
Proj. WR-007-05-01

Descriptors: (*Steel, Corrosion), (*Corrosion, Steel), Stresses, Hydrogen embrittlement, Microstructure, Hardness, Tensile properties.

Studies of the structural changes associated with stress corrosion and delayed failure in AISI 4340 steel have shown that significant changes take place in both the internal structure and the fracture-surface morphology as a result of specific treatments, particularly the cathodic portion of the corrosion reaction. The incipient stage of stress cracking may be the result of stress corrosion, hydrogen embrittlement, or both, inasmuch as either corrosion or cathodic charging regenerates visible stacking faults in martensite. The regeneration of these stacking faults is believed to be the cause of transgranular fracture in the initial stages of stress-corrosion cracking. Examination of the fracture-surface morphology of stress-corrosion cracked and hydrogen-cracked alloys indicates that, after the initial reaction, hydrogen diffuses to and along prior-austenite grain boundaries and causes intergranular failure. The most likely mechanism for intergranular failure appears to be reduction of prior-austenite grain boundary energy as a result of adsorbed hydrogen. The analysis of fracture morphology of stress-corrosion failures is compared with that of a hydrogen-cracked fracture surface modified by a subsequent anodic treatment in the corrosion medium. (Author)

AD-641 315 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
A STUDY OF THE SIZE EFFECT IN THE PLATING EMBRITTLEMENT OF HIGH STRENGTH STEELS.
Technical rept.,
by H. C. Davis, and Josephine A. Gray. Jun 66, 22p TR-66168

Descriptors: (*Steel, Embrittlement), Plating, Cadmium, Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Loading (Mechanics), Tests, Life expectancy, Stresses, Fracture (Mechanics), Great Britain.

The report describes sustained load tests made on cadmium plated notched (K sub t = 3.2) specimens 1/4 in and 1 in diameter. Two steels were studied, En 24 and NCMV heat treated to 120 ton/sq in TS. The results showed that En 24 was very susceptible to plating embrittlement, the maximum stress for unlimited life being in the region of 43 ton/sq in (30% NTS). NCMV steel was found to be less sensitive having a corresponding value of 62-70 ton/sq in (40 to 45% NTS). Comparative tests on NCMV steel showed no significant difference between the lives of large and small specimens. In determining the life under sustained load, a minimum testing time of 500 hr was found to be necessary. (Author)

AD-641 428 **Field 11F**
CFSTI Prices: HC$7.00 MF$1.50
Carnegie Inst. of Tech., Pittsburgh, Pa.
TRANSFORMATION KINETICS, MICROPLASTICITY AND AGING OF MARTENSITE IN Fe-31 Ni.
Doctoral thesis,
by C. L. Magee, and H. W. Paxton. 1 Sep 66, 309p
Contract Nonr-760 (14)
Proj. NR-036-029

Descriptors: (*Iron alloys, Metallurgy), (*Martensite, Iron alloys), Transformations, Dynamics, Plasticity, Aging (Materials), Microstructure, Nickel alloys.

The effects of testing temperature and volume fraction of martensite on the microplastic response of unaged Fe-31 Ni martensite-austenite aggregates have been determined. These results, supplemented by other experimental studies, show that two unusual mechanisms of plastic deformation give rise to the apparent softness of the quenched structures. The transformation of retained austenite to martensite during the application of stress gives rise in specified conditions to large microplastic strains. The other strain component, which dominates the microdeformation above the temperature range where transformation occurs, is attributed to stress-assisted relaxation of internal stresses. The measured changes in elastic modulus and internal friction (at 80 kHz) during aging of Fe-31 Ni after quenching cannot be explained by the diffusion of point defects to dislocations. It is suggested that this aging effect is instead due to the motion of dislocations which occurs in order to decrease the internal stress. Experimental results pertaining to the kinetics of the austenite to martensite phase transformation show that no distinguishable athermal component of transformation exists in the Fe-31 Ni alloy. A model for martensitic kinetics is developed which treats the propagation of the interface as analogous to plastic deformation. This model and reconsideration of the implications of dislocation motion in the kinetics of embryo formation both lead to the conclusion that martensitic kinetics should be of a 'fast isothermal' character. (Author)

AD-641 607 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Theoretical and Applied Mechanics.
MECHANISMS OF ENVIRONMENT INDUCED SUBCRITICAL FLAW GROWTH IN AISI 4340 STEEL.
Final rept., 1 May 65-30 Apr 66,
by H. T. Corten, and W. A. Van Der Sluys. Oct 66, 4p
Contract DA-31-124-ARO (D)-378
Proj. DA-200145-01B32D
AROD-5612:2

Descriptors: (*Steel, Defects (Materials), Fracture (Mechanics), Hydrogen embrittlement, Corrosion, Beams (Structural), Water, Environmental tests.

Identifiers: Steel 4340.

An experiment designed to study the effect of several variables on the subcritical crack growth rate of a high-strength steel in a water environment was conducted. Double cantilever beam specimens of an AISI 4340 steel were employed to study crack extension rates. The environmental variables included temperature, pH of the liquid environment, electric charging and the combined effect of pH and electric charging. (Author)

AD-641 662 **Field 11F, 13H, 7**
CFSTI Prices: HC$2.60 MF$0.50
Naval Air Material Center, Philadelphia, Pa. Aeronautical Materials Lab.
A RADIOCHEMICAL INVESTIGATION OF THE MECHANISM OF FORMATION OF CYANIDE FILMS ON STEEL COMPONENTS IN ALKALI-CYANIDE ELECTROPLATING BATHS,
by A. L. Glass. 23 Aug 60, 24p NAMC-AML-1137
Proj. RRMA-4013

Descriptors: (*Electroplating, *Hydrogen embrittlement), (*Cadmium, Electrodeposition), (*Cyanides, Electrodeposition), Steel, Films, Tracer studies, Adsorption, Chemisorption, Radiochemistry.

In connection with the increased hydrogen embrittlement of steel after having been cadmium plated in an alkali-cyanide plating bath, a radiochemical investigation is reported in which it is demonstra-

ed that an adsorbed layer of cyanide is formed on the steel parts. It is also demonstrated that this action takes place as a van der Waal adsorption until an electrical current is applied, following which, further formation of cyanide then takes place on the cathode-through chemisorption. (Author)

AD-641 780 **Field 11F, 20B**
Not available from CFSTI.
Illinois Univ., Urbana. Dept. of Mining, Metallurgical, and Petroleum Engineering.
DIFFUSION OF V48 AND Fe59 IN VANADIUM.
Revised ed.,
by R. F. Peart. 18 May 65, 12p
Grant AF-AFOSR-633-64
Proj. AF-9763
Task 976301
AFOSR-66-1535
Revision of Manuscript submitted 22 Jan 65.
Availability: Published in Journal of Physics and Chemistry of Solids v26 p1853-61 May 1965.

Descriptors: (*Vanadium, Diffusion), Single crystals, High-temperature research, Heat of activation, Tracer studies, Iron.

Measurements have been made of tracer diffusion coefficients of V48 and Fe59 in single crystals of vanadium over the temperature range 840-1830C. The V48 results show temperature dependent diffusion characteristics that are represented by activation energies of 94 kcals/mole above 1356C and 72 kcals/mole below this temperature, and those for Fe59 by an activation energy of 70 kcals/mole in the temperature range 840-1170C. No single explanation of these results is offered but the low temperature data appear to be consistent with the operation of a vacancy mechanism of diffusion. Other results associated with grain boundary diffusion, surface effects and dislocation diffusion are presented and briefly discussed. (Author)

AD-641 785 **Field 11F, 20L**
Not available from CFSTI.
Illinois Univ., Urbana. Dept. of Mining, Metallurgy, and Petroleum Engineering.
ANISOTROPY OF THE SNOEK PHENOMENON IN NIOBIUM.
Interim rept.,
by R. A. Hoffman, and C. A. Wert. 22 Jun 65, 5p
Grant AF-AFOSR-633-64
Proj. AF-9763
Task 976301
AFOSR-66-1488
Availability: Published in Journal of Applied Physics v37 n1 p237-40 Jan 1966.

Descriptors: (*Niobium, Impurities), (*Crystal lattices, Relaxation time), Oxygen, Nitrogen, Oscillation, Damping, Crystal structure, Anisotropy.

Identifiers: Snoek effect.

The anisotropy of the strength of the Snoek relaxation was measured for both oxygen and nitrogen in niobium. Single crystals of niobium of extreme orientations, /100/ and /111/, as well as several intermediate orientations were grown in an electron beam melter. The height of the Snoek peaks of the residual oxygen and nitrogen was measured at 80 kcps using a quartz transducer. The orientation for which the peak height is maximum is /100/; the orientation for which it is minimum is /111/ -it is actually zero for this orientation. This result shows that the interstital site is symmetrical about /111/, but it alone does not differentiate between occupancy by the interstitial of the octahedral and tetrahedral sites. (Author)

AD-641 786 **Field 11F, 20L**
Not available from CFSTI.
Illinois Univ., Urbana.
AN INTERNAL FRICTION STUDY OF VACANCIES IN A QUENCHED Au-Ni SOLID SOLUTION.
Interim rept.,
by J. R. Cost. 12 May 65, 6p
Grant AF-AFOSR-633-64
Proj. AF-9763
Task 976301
AFOSR-66-1601
Revision of manuscript submitted 8 Mar 65.
Availability: Published in Acta Metallurgica v13 p1263-7 Dec 1965.

Descriptors: (*Gold alloys, Internal friction), (*Nickel alloys, Internal friction), (*Internal friction, Relaxation time), Annealing, Quenching (Cooling), Thermodynamics, Crystal substructure, Solid solutions.

Identifiers: Zener relaxation.

Changes in the vacancy concentration in a quenched Au-30 at.% Ni alloy are followed using isothermal internal friction measurements of the Zener relaxation rate. Analysis of the vacancy annealing yields a value of approximately 21 kcal/mole for the energy for vacancy motion. From this energy of motion, typical rates of shifting of the Zener peak temperature are obtained. This peak shift is used to interpret a previously unexplained internal friction peak observed in this alloy. (Author)

AD-641 896 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
PREPARATION OF CrFe ALLOYS,
by J. E. Cox. 5 Oct 66, 18p NRL-6457
Proj. RR-010-01-44-5601

Descriptors: (*Chromium alloys, Refining (Metallurgy)), (*Iron alloys, Refining (Metallurgy)), Arc melting, Preparation, Induction heating, Vacuum furnaces.

High purity, homogeneous samples were prepared for a study of the thermoelectric power and electrical resistivity of the CrFe system. The use of an induction heater for making these samples at first appeared to be ideal because of its ability to generate high temperature and its magnetic stirring properties. However, the chromium component of the molten alloy at this temperature is quite reactive, and a crucible material was not found that would remain inert and intact. The next device that was tried, an arc furnace, did fill the requirement of being able to contain the melt without reacting with it. The samples were successfully melted on a water-cooled copper hearth with an arc initiated from a water-cooled tungsten tip, under one-half atmosphere of argon. The samples made were of 5-9's purity and were homogeneous to within plus or minus 0.2% of their entire volume of some 2 cc. Further difficulty was encountered in reducing the rough, as-cast ingot to a usable geometry. In this case a uniform cylinder was desired of approximately 1/8-inch diameter and 2-1/2-inch length. This difficulty was overcome by spark-erosion machining of the rough ingot to near cylindrical form, followed by centerless grinding to a perfect cylinder. (Author)

AD-641 902 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Rocket Propulsion Establishment, Wescott (England).
THE EFFECT OF PRE-STRAINING OF THE TENSILE PROPERTIES OF STAINLESS STEEL En58b AT 20C AND -196C.
Technical rept.,
by P. Midgley. Apr 66, 26p RPE-TR-66/3

Descriptors: (*Stainless steel, Tensile properties), Strain (Mechanics), Cryogenics, Great Britain, Aging (Materials).

The effect of pre-straining an austenitic stainless steel to produce a structural transformation from austenite to martensite with resulting increase of tensile strength has been known for some time. In the investigation reported here the effect of pre-straining stainless steel En58b at room temperature and at the temperature of liquid nitrogen (-196C) on the tensile properties at room temperature and -196C has been studied to determine whether because of the increase of tensile strength it is possible to apply the technique of stretch forming to rocket motor structures. (Author)

AD-641 930 **Field 11F, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
INVESTIGATION OF THE OXIDATION RESISTANCE OF ZIRCONIUM BORIDE-MOLYBDENUM DISILICIDE ALLOYS.
ATD work assignment no. 88,
by M. A. Kuzenkova, and P. S. Kislyi. 30 Aug 66, 9p ATD-66-73
TT-66-62594
Issledovanie Okalinostoikosti Splavov Borida Tsirkoniya s Disilitsidom Molibdena, trans. of Poroshkovaya Metallurgiya (USSR) v5 n10 p75-9 1965. Translations of Foreign Scientific and Technical Literature.

Descriptors: (*Zirconium alloys, Corrosion resistance), (*Molybdenum alloys, Corrosion resistance), Boron alloys, Silicon alloys, Corrosion-resistant alloys, USSR, Corrosion inhibition, Coatings, Oxidation.

Identifiers: Zirconium boride, Molybdenum disilicide.

This work examines the oxidation resistance of pure zirconium boride and zirconium boride-molybdenum disilicide alloys. It was found that the oxidation resistance of the zirconium boride-molybdenum disilicide alloys considerably exceeds that of pure zirconium boride, which, like all the other borides of transition metals, begins to oxidize in an oxygen or air medium at temperatures of only 700-800C. The article describes the process by which they oxidize the specimens. The zirconium boride specimens do not disintegrate, however, because it was found that they are covered with a protective film. Protective films are also formed in the oxidation process of the zirconium boride-molybdenum disilicide alloys, this process differing from that of pure zirconium boride. The films are analyzed and their effect is discussed. The authors explain the reason for the higher protective properties of the films formed on the alloys as compared to those formed on pure zirconium boride and they conclude that the zirconium boride-molybdenum disilicide alloys possess an exceptionally high oxidation resistance and can be used at temperatures up to 1500-1550C. (Author)

AD-641 932 **Field 11F, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
NEW FINDINGS ON ANODIC OXIDATION OF ALUMINUM,
by W. Kaden. Jun 66, 13p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C024401A328
ERDL-T-1853-66, TT-66-62593
Neuere Erkenntnisse und Erfahrunden ueber veschiedene Variationen der anodischen Oxydation des Aluminiums, trans. of Aluminium (West Germany) v39 n7 p424-8 Jul 1963.

Descriptors: (*Aluminum, Oxidation), (*Anodic coatings, Aluminum), West Germany, Hardness, Porosity, Colors, Density, Processing.

One of the anodic-oxidation processes discussed is the 'Veroxal' process which produces films characterized by special high hardness and characteristic coloration. The Veroxal process produces films with tints from silver yellow over brown and various bronze tints to black. The colorations are absolutely light proof and are all obtained with the same bath composition. The color differences are obtained by employing different alloys and, to a

limited extent, through different film thickness. Shading of color can be obtained by employing different densities and bath temperatures.

AD-641 990 **Field 11F, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Technion - Israel Inst. of Tech., Haifa. Material Mechanics Lab.
DISCONTINUOUS YIELDING OF COMMERCIALLY PURE ALUMINUM,
by S. R. Bodner, and A. Rosen. Sep 66, 39p
Scientific-2, MML-4
Contract AF 61 (052)-951
Proj. AF-9782
Task 978202
AFOSR-66-2607
See also AD-641 995.

Descriptors: (*Aluminum, Deformation), Aging (Materials), Loading (Mechanics), Stresses, Strain (Mechanics).

The discontinuous, repeated yielding of commercially pure aluminum under slowly applied dead weight loading is examined as a dynamic instability problem. The destabilizing factor is shown to be the negative slope of the flow stress-strain rate relation which, for aluminum, is a consequence of rapid strain ageing. The essentials of the phenomenon are illustrated by a dry friction model which incorporates a counterpart of strain hardening. More generalized models show the equivalent of progressive yielding over the specimen length and delayed yielding under incremental loading. A stepped stress-strain curve is derived from the experimental flow stress-strain rate relation which agrees well with the observations in dead weight loading tests. Additional experiments on an Instron testing machine were performed with variable machine flexibility and strain gage recording. These test results support the explanation of the origin of the stepped stress-strain curves. (Author)

AD-641 995 **Field 11F, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Technion - Israel Inst. of Tech., Haifa. Material Mechanics Lab.
THE INFLUENCE OF STRAIN RATE AND STRAIN AGEING ON THE FLOW STRESS OF COMMERCIALLY PURE ALUMINUM.
Interim scientific rept.,
by A. Rosen, and S. R. Robner. Aug 66, 43p
Scientific-1, MML-3
Contract AF 61 (052)-951
Proj. AF-9782
Task 978202
AFOSR-66-2587
See also AD-641 990.

Descriptors: (*Aluminum, Deformation), Aging (Materials), Strain (Mechanics), Stresses, Tensile properties, Loading (Mechanics).

Tensile tests on annealed, commercially pure aluminum specimens were performed in a hard machine at different temperatures for a number of constant strain rates. The results show that a range of strain, strain rate, and temperature exists for which the flow stress decreases with strain rate. This material property, when coupled with suitable mechanical conditions, is believed to be cause of discontinuous, repeated yielding. Various experiments, especially relaxation and reloading tests, show that the decrease of flow stress with strain rate can be directly attributed to rapid strain ageing due to impurity diffusion. Other experiments indicate the same effect for different loading histories. An analytical representation of the strain rate and strain ageing of the material is developed which predicts results in very good agreement with the experiments. (Author)

NBS-Misc-Pub-260-14 **Field 11F, 7B**
CFSTI Prices: HC$0.30 MF$0.50
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.
STANDARD REFERENCE MATERIALS: DETERMINATION OF OXYGEN IN FERROUS MATERIALS SRM 1090, 1091, AND 1092,
by Oscar Menis, and J. T. Sterling. 23 Sep 66, 36p

Descriptors: (*Steel, Analysis), (*Iron alloys, Analysis), (*Oxygen, Iron alloys), Standards, Melting, Vacuum, Carbon monoxide, Infrared spectroscopy, Carbon dioxide, Freezing.

A description is presented of methods used for the determination of homogeneity and the establishment of the oxygen values certified by NBS for three ferrous standard reference materials. These standards are represented by ingot and vacuum melted iron containing 484 and 28 ppm of oxygen respectively, and a high alloy steel containing 131 ppm of oxygen. The analyses of these materials are based on two vacuum fusion procedures. The first method is based on manometric measurements and depends on the conversion of CO to CO2 by copper oxide and on a differential freezing of gases. In the second method a system is used which provides a highly efficient degassing of sample and a direct measurement of CO by infrared absorbancy. From control data and homogeneity studies it was ascertained that the uncertainty limits stated in the NBS certificate include the error due to the relative inhomogeneity between rods. Finally, data from eighteen laboratories cooperating in this program are presented. (Author)

N66-32795 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
National Research Corp., Cambridge, Mass. Norton Exploratory Research Div.
A STUDY OF THE ADHESION AND COHESION OF METALS FOURTH QUARTERLY PROGRESS REPORT, 9 MAR. - 9 JUN. 1966.
by M. J. Hordon. Jun 66, 16p NASA-CR-76920
Contract NASW-1168

Descriptors: *Adhesion, *Heat treatment, *Metal, *Test equipment, Abrasion, Alloy, Apparatus, Cohesion, Element, Equipment, Heat, Modification, Specimen, Test, Treatment, Vacuum.

For abstract, see STAR 04 19.

N66-32805 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
Syracuse Univ. Research Inst., N. Y. Dept. Of Chemical Engineering And Metallurgy.
ADHESION BETWEEN ATOMICALLY PURE METALLIC SURFACES, PART IV SEMIANNUAL REPORT.
by K. Johnson, D. V. Keller Jr, and W. Saunders. Jul 66, 48p NASA-CR-76865, MET-1100-667SA
Grant NSG-483-1

Descriptors: *Contact resistance, *Contamination, *Metal bonding, *Metal surface, *Vacuum effect, Adhesion, Bonding, Cold, Contact, Effect, Electric, Environment, Measurement, Metal, Molybdenum, Property, Resistance, Surface, Titanium, Tungsten, Vacuum, Welding.

For abstract, see STAR 04 19.

N66-33019 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
METALLOGRAPHIC STUDY OF DISPERSION-STRENGTHENED ALLOYS AFTER FAILURE IN STRESS RUPTURE.
by C. A. Hoffman, and J. W. Weeton. Aug 66, 36p NASA-TN-D-3527

Descriptors: *Dispersion hardening, *Metallography, *Microstructure, *Stress rupture, Dispersion, Factor, Failure, Hardening, Impurity, Material, Particle, Porosity, Relation, Rupture, Size, Stability, Strength, Stress, Temperature.

For abstract, see STAR 04 19.

N66-33023 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
General Dynamics Corp., San Diego, Calif.
DIFFUSION AND ELECTRON EMISSION PROPERTIES OF DUPLEX REFRACTORY METAL THERMIONIC EMITTERS.
by R. G. Hudson, and L. Yang. Aug 66, 29p
NASA-CR-529
Contract NAS3-4165

Descriptors: *Electron diffusion, *Refractory metal, *Thermionic emission, Deposition, Diffusion, Duplex, Electron, Emission, Iridium, Metal, Metallurgy, Microprobe, Powder, Property, Refractory, Rhenium, Thermionic, Tungsten.

For abstract, see STAR 04 19.

N66-33035 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
United Kingdom Atomic Energy Authority, Risley (England). Reactor Group.
THE STRAIN RATE SENSITIVITY OF THE YIELD STRESS OF STEELS.
by G. D. Fearnehough. 1966, 24p TRG-1248/C/

Descriptors: *Neutron bombardment, *Steel, *Strain rate, Bombardment, Charpy impact test, Dynamic, Irradiation, Material, Neutron, Rate, Reactor, Strain, Stress, Temperature, Yield.

For abstract, see STAR 04 19.

N66-33404 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
Rice Univ., Houston, Tex.
EASY GLIDE IN MOLYBDENUM CRYSTALS.
by F. R. Brotzen, and L. D. Whitmire. 1966, 9p
NASA-CR-77030
Grant NSG-6

Descriptors: *Electron beam, *Molybdenum, *Shear strain, *Zone refining, Beam, Crystal, Ease, Electron, Flow, Glide, Impurity, Purity, Rate, Refining, Shear, Strain, Stress, Zone.

For abstract, see STAR 04 19.

N66-33405 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
Rice Univ., Houston, Tex.
THE EFFECTS OF DEFORMATION ON THE ELECTRICAL RESISTIVITY OF MOLYBDENUM SINGLE CRYSTALS.
by F. R. Brotzen, and L. D. Whitmire. 1966, 26p
NASA-CR-77029
Grant NSG-6-59

Descriptors: *Deformation, *Electric resistance, *Molybdenum, *Single crystal, Crystal, Defect, Dislocation, Electric, Flow, Line, Point, Resistance, Resistivity, Single, Strain, Stress, Temperature.

For abstract, see STAR 04 19.

N66-33410 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. Of Materials Engineering.
EXPERIMENTAL X-RAY STRESS ANALYSIS PROCEDURES FOR ULTRA HIGH STRENGTH MATERIALS.
by W. J. Barkley III, W. R. Clough, L. A. Jackman, F. P. Reilly III, and H. R. Woehrle. 1964, 24p NASA-CR-59602
Grant NSG-100

Presented At Ann. Conf. On Appl. Of X-ray Analysis, Denver, Aug. 1964 Submitted For Publication

Descriptors: *Elastic strength, *High strength steel, *Uniaxial strain, *X-ray stress measurement, Analysis, Elastic, High strength, Measurement, Procedure, Steel, Strain, Strength, Stress, Testing, Uniaxial, X-ray.

For abstract, see STAR 04 19.

N66-33427 **Field 11F**
CFSTI Prices HC$4.00 MF$1.00
National Aero- And Astronautical Research Inst., Amsterdam (Netherlands).
REPORTS AND TRANSACTIONS, VOLUME XXXI.
1965, 122p
Sponsored By Neth. Aircraft Develop. Board

Descriptors: *Crack propagation, *Metal fatigue, Alloy, Aluminum, Crack, Effect, Failure, Fatigue, Frequency, Hardness, Heat, Metal, Propagation, Sheet, Stress, Temperature, Thickness, Treatment, Width.

For abstract, see STAR 04 19.

N66-33432 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF MECHANICAL PROPERTIES OF CHROMIUM, CHROMIUM-RHENIUM, AND DERIVED ALLOYS TWENTY-THIRD QUARTERLY PROGRESS REPORT, OCT. 1, 1965 - MAR. 31, 1966.
by A. Gilbert, and M. J. Klein. 1 Jun 66, 25p NASA-CR-76856
Contract NASW-101

Descriptors: *Chromium alloy, *Mechanical property, *Rhenium alloy, *Wire, Alloy, Bending, Chromium, Cracking, Ductility, Fractography, Hardness, Heat, Impurity, Mechanical, Metallography, Nitrogen, Property, Rhenium, Temperature, Transition, Treatment, Twinning.

For abstract, see STAR 04 19.

N66-33504 **Field 11F**
CFSTI Prices HC$3.00 MF$1.00
Trw, Inc., Cleveland, Ohio. Materials And Processes Dept.
DEVELOPMENT OF HIGH TEMPERATURE NICKEL-BASE ALLOYS FOR JET ENGINE TURBINE BUCKET APPLICATIONS SECOND INTERIM ENGINEERING REPORT, 1 OCT. 1965 - 31 MAY 1966.
by H. E. Collins. 20 Jun 66, 145p NASA-CR-72011, TRW-ER-6873
Contract NAS3-7267

Descriptors: *Nickel alloy, *Turbine blade, Alloy, Blade, Bucket, Engine, Evaluation, High temperature, Jet, Life, Mechanical, Microstructure, Nickel, Property, Rupture, Strength, Stress, Tensile, Turbine.

For abstract, see STAR 04 19.

N66-33687 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
PHASE DIAGRAM AND PROPERTIES OF ALLOYS OF THE ALUMINUM-SCANDIUM SYSTEM.
Diagramma Sostoyaniya I Svoystva Splavov Sistemy Alyuminiy-skandiy
by O. P. Naumkin, YE. M.Savitskiy, and V. T. Terekhova. Jul 66, 17p NASA-TT-F-10225
Transl. Into English From Izv. Akad. Nauk Sssr, Metally (Moscow), No. 4, 1965 P 176-182

Descriptors: *Aluminum alloy, *Phase diagram, *Scandium, Alloy, Aluminum, Concentration, Diagram, Earth, Metallography, Phase, Rare, Strength, System, Transformation, U.s.s.r..

For abstract, see STAR 04 19.

N66-33690 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
HEAT-RESISTANT CHROMIUM CARBIDE COATING WITH A SILICATE BINDER.
Zharostoykoye Pokrytiye Iz Karbida Khroma S Silikatnoy Svyazkoy
by YE. A.Antonova, and N. N. Popov. Jun 66, 14p NASA-TT-F-10186
Transl. Into English From Zashchita Metallov (Ussr), V. 1, No. 6, 1965 P 687-691

Descriptors: *Chemical composition, *Chromium carbide, *Heat resistance, *Protective coating, Adhesion, Air, Binder, Carbide, Chemical, Chromium, Coating, Composition, Enamel, Formation, Heat, High temperature, Oxidation, Protection, Resistance, Shock, Silicate, Steel, Thermal.

For abstract, see STAR 04 19.

N66-33704 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
ELECTRON DIFFRACTION STUDY OF THE OXIDATION PROCESS OF THIN FILMS OF INTERMETALLIC COMPOUNDS OF THE SYSTEM NICKEL-ALUMINUM.
Elektronograficheskoye Issledovaniye Protsessov Okisleniya Tonkikh Plenok Intermetallicheskikh Soyedineniy Sistemy Nikel'-alyuminiy
by R. I. Nazarova. May 66, 12p NASA-TT-F-10156
Transl. Into English From Izv. Akad. Nauk Sssr, Ser. Khim. (Moscow), No. 7, 1964 P 1164-1167

Descriptors: *Aluminum compound, *Electron diffraction, *Intermetallics, *Nickel compound, *Oxidation, *Thin film, Alloy, Aluminum, Compound, Condensation, Cooling, Deposition, Diagram, Diffraction, Electron, Evaporation, Film, Heat, Liquid, Metal, Nickel, Nitrogen, Phase, Process, Reflection, Resistance, System, Thin, Vapor.

For abstract, see STAR 04 19.

N66-33722 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
INVESTIGATIONS OF EFFECT OF INTERSTITIAL IMPURITIES ON THE STRUCTURE AND PROPERTIES OF TUNGSTEN SINGLE CRYSTALS.
Dasledavanne Uplyvu Prymesey Ukaranennya Na Strukturu I Ulastsivastsi Monakryshtalyau Val'framu
by YE. M.Savitskiy, and G. L. Tsarev. Jun 66, 20p NASA-TT-F-10157
Transl. Into English From Vestsi Akad. Navuk Belarusk. Ssr, Ser. Fiz-tekh. Navuk (Minsk), No. 2, 1965 P 84-91

Descriptors: *Lattice imperfection, *Mechanical property, *Single crystal, *Tungsten, Brittleness, Carbon, Crystal, Density, Dispersion, Hydrogen, Imperfection, Lattice, Low temperature, Mechanical, Nitrogen, Oxygen, Property, Saturation, Single, Structure.

For abstract, see STAR 04 19.

N66-33976 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Space Power And Propulsion Section.
ADVANCED REFRACTORY ALLOY CORROSION LOOP PROGRAM QUARTERLY PROGRESS REPORT NO. 4, JAN. 15 - APR. 15, 1966.
by R. W. Harrison. 29 Apr 66, 47p NASA-CR-72029
Contract NAS3-6474

Descriptors: *Closed loop system, *Corrosion, *Molybdenum alloy, *Potassium, *Refractory alloy, *Titanium alloy, Alloy, Assurance, Closed, Evaluation, Liquid, Lithium, Loop, Material, Molybdenum, Niobium, Procurement, Program, Quality, Refractory, Tantalum, Titanium.

For abstract, see STAR 04 19.

N66-33983 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF TUNGSTEN-FIBER-REINFORCED COPPER COMPOSITES.
by D. L. Mc danels. Aug 66, 19p NASA-TN-D-3590

Descriptors: *Composite material, *Copper, *Electric resistance, *Reinforcing fiber, *Tungsten, Composite, Conductivity, Electric, Fiber, Infiltration, Liquid, Material, Phase, Reinforcement, Resistance, Strength, Technique, Tensile, Wire.

For abstract, see STAR 04 19.

N66-38113 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
X-RAY MEASUREMENT OF RESIDUAL STRESSES IN TITANIUM ALLOY SHEET.
by D. N. Braski, and D. M. Royster. 1966, 38p NASA-TM-X-57930
Presented At The 15th Ann. Conf. On Appl. Of X-ray Analysis, Denver, 10-12 Aug. 1966

Descriptors: *Residual stress, *Titanium alloy, *X-ray diffraction, Alloy, Aluminum, Corrosion, Fatigue, Measurement, Relaxation, Sheet, Stress, Tensile, Vanadium, Vibration.

For abstract, see STAR 04 23.

N66-38147 **Field 11F**
CFSTI Prices HC$4.00 MF$1.00
Solar, San Diego, Calif.
PROTECTIVE COATINGS FOR CHROMIUM ALLOYS FINAL SUMMARY REPORT, 31 MAY 1965 - 30 JUN. 1966.
by W. D. Brentnall, H. E. Shoemaker, and A. R. Stetson. 20 Aug 66, 122p NASA-CR-54535, RDR-1398-2
Contract NAS3-7266

Descriptors: *Chromium alloy, *Protective coating, *Tungsten alloy, Coating, Molybdenum, Nitrogen, Protection, Rhenium, Silicide, Silicon, System, Ternary, Titanium, Vanadium.

For abstract, see STAR 04 23.

N66-38498 **Field 11F**
CFSTI Prices HC$2.50 MF$0.75
Lessells And Associates, Inc., Waltham, Mass.
RESIDUAL STRESSES IN 17-4 PH STEEL.
10 Nov 65, 84p NASA-CR-66197
Contract NAS1-4577
Its Tech. Rept.- 869/p96

Descriptors: *Dimensional stability, *Heat treatment, *Residual stress, *Steel, *Strain gauge balance, Axial, Bar, Bending, Effect,

Flow, Influence, Longitudinal, Machining, Plastic, Surface, Testing.

For abstract, see STAR 04 23.

N66-38644 **Field 11F**
CFSTI Prices HC$4.00 MF$1.00
Societe D Etudes, De Recherches Et D Applications Pour L Industrie, Brussels (Belgium).
STUDIES OF STEEL CORROSION IN HIGH-TEMPERATURE WATER AND STEAM QUARTERLY REPORT NO. 14, 1 JAN. - 31 MAR. 1966.
29 Apr 66, 137p EURAEC-1625, EUR-2838
Contract EURATOM-087-66-1 TEEB (RD)
Transl. Into English From French

Descriptors: *Corrosion test, *High temperature fluid, *Steam, *Steel, Chromium, Decomposition, Drawing, Effect, Hardening, Nickel, Oxidation, Recrystallization, Stainless, Surface.

For abstract, see STAR 04 23.

N66-38750 **Field 11F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
INVESTIGATION OF MAGNETICALLY SOFT, HIGH-TEMPERATURE COBALT-IRON ALLOY.
by J. Barranger. Oct 66, 8p NASA-TN-D-3693
Contract 120-27-04-18-22

Descriptors: *Cobalt alloy, *High temperature research, *Iron alloy, *Magnetic material, Binary, Coercivity, Curie temperature, Force, High temperature, Induction, Magnetic, Maximum, Permeability, Property, Residual, Soft, Ultrapure metal.

For abstract, see STAR 04 23.

N66-38755 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
Eitel-mccullough, Inc., San Carlos, Calif.
INVESTIGATION OF SOLUBILITY AND DIFFUSION OF OXYGEN IN REFRACTORY METALS SECOND QUARTERLY REPORT, 1 OCT. - 31 DEC. 1965.
by R. Pape, and L. Reed. Jan 66, 45p NASA-CR-54648, TR-66-15
Contract NAS3-7626

Descriptors: *Electric resistance, *Molecular diffusion, *Niobium, *Oxygen detector, *Solubility, *Tantalum, Alloy, Apparatus, Constant, Diffusion, Electric, Experiment, Limit, Measurement, Molecular, Oxygen, Resistance.

For abstract, see STAR 04 23.

N66-38791 **Field 11F**
CFSTI Prices HC$2.00 MF$0.50
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile And Space Systems Div.
DUCTILITY LIMITATIONS OF ALUMINUM-SILICON ALLOYS.
by W. A. Bailey, and S. Frederick. 19 Aug 66, 40p NASA-CR-78597, DAC-59518
Contract NAS7-101

Descriptors: *Aluminum alloy, *Mechanical property, *Microstructure, Casting, Cell, Dendrite, Ductility, Fracture, Limitation, Rate, Silicon, Size, Solidification, Strain, Strength.

For abstract, see STAR 04 23.

PB-173 413 **Field 11F, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
EFFECT OF STRAIN RATE ON THE YIELD STRESS OF STRUCTURAL STEELS,
by N. R. Nagarajo Rao, Manfred Lohrmann, and Lambert Tall. 1966, 23p Fritz Reprint-293
Journal of Materials v1 n1 p241-62 Mar 1966.

Descriptors: (*Mechanical properties, *Steel), Mechanics, Strain (Mechanics), Yield point, Strain hardening, Test methods.

Tests were conducted on specimens of ASTM steels A 36, A 441, and A 514 to determine the effect of strain rate on yield stress in the plastic range. Thickness of coupons varied from 1/4 to 3/4 in. A 120,000 psi universal testing machine with timer was used for all tests. Static and dynamic yield stresses were determined for these steels. Test results indicate that (1) there is no simple relationship between crosshead speed and strain rate. Gage length affects strain rate in both elastic and plastic ranges. (2) Static yield stress is a property of steel independent of size of specimen and is not a function of elastic recovery of the testing machine. (3) Yield stresses computed from developed equations agreed with measured results within 95 per cent confident limits. (4) Dynamic yield stress ratio increased rapidly at low strain rates and slowly at high strain rates. (5) An average curve relating (dynamic yield stress level - static yield stress level) and strain rate was established. (Author)

AD-286 698 **See Field 10B**

AD-407 471 **See Field 21E**

AD-453 901 **See Field 13H**

AD-480 198 **See Field 20K**

AD-641 405 **See Field 5A**

AD-641 492 **See Field 20C**

AD-641 798 **See Field 20B**

AD-641 799 **See Field 20C**

AD-641 801 **See Field 20C**

AD-641 802 **See Field 20C**

AD-641 974 **See Field 13H**

N66-37780 **See Field 18H**

11G. MISCELLANEOUS MATERIALS

AD-338 257 **Field 11G**
CFSTI Price: HC$2.60
Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
DIELECTRIC MATERIALS FOR HIGH TEMPERATURE APPLICATION.
Quarterly rept. no. 1, 15 Feb-14 May 63.,
by Joseph Green, Nathan Mayes, and Richard Crooker. 14 May 63, 29p Rept. no. RMD-6026-Q1
Contract NObs-88318
Proj. SF-007-03-03
Tasks 1000, 1003

Descriptors: (*Dielectrics, High-temperature research), (*Embedding substances, Thermal stability), (*Elastomers, Aging (Materials)), Siloxanes, Carbon compounds, Polymers, Molecular weight.

Research was conducted toward the preparation of thermally stable carborane silicone materials for use as embedding compounds and elastomers. Two new carborane silicone intermediates and the polymers prepared from them are reported. Curing studies were conducted, including the preparation of polymers with functional curing sites. Isolation of a carborane cyclotetrasiloxane is reported and work was conducted toward the preparation of cyclotetrasiloxanes and cyclotrisiloxanes for use as intermediates in the preparation of high molecular weight carborane silicones by ring opening methods.

AD-455 096 **Field 11G, 17A**
CFSTI Price: HC$1.00
General Telephone and Electronics Labs., Inc., Bayside, N. Y.
INVESTIGATION OF PHOTOCONDUCTOR MATERIALS FOR A SOLID-STATE SONAR DISPLAY.
Interim development rept. no. 3, 13 Oct 64-14 Jan 65.
25 Jan 65, 14p TR-65-210-10
Contract NObsr-91167
Proj. SF0070502
Task 9457

Descriptors: (*Photoelectric materials, Sonar equipment), (*Electroluminescence, Display systems), (*Display systems, Sonar equipment), Design, Effectiveness, Simulation, Photoconductivity, Brightness, Time, Measurement, Servomechanisms.

The purpose of this contract is to develop and construct a solid-state sonar display of variable persistence. The display device utilizes a layer of electroluminescent material to generate the output light and a control layer of photoconductive material which accepts an input illumination from a servodriven wand. An opaque enamel layer between the other two layers is used to prevent optical coupling between the display output light or ambient illumination and the control photoconductor. Full-size display panels with the 50 range elements and 36 angular positions have been constructed. The photoconductor was sintered onto the panels in a specially designed two-zone furnace. Good brightness and brightness-decay uniformity have been achieved. Decay to one tenth of original brightness of 9 sec maximum and 250 ms minimum were obtained. The filter circuits of the government-furnished equipment were tuned and the whole system performance was evaluated with an input generated by two types of simulators. One of the simulators was synchronous and generated an input which procuded a fixed pattern on the display panel. A second simulator produced a constantly changing trace on the display. Both of these tests confirmed earlier predictions that the bandwidth of the filters did not permit a single element output on the panel. (Author)

AD-455 328 **Field 11G, 22B**
CFSTI Price: HC$10.60
Boeing Co., Seattle, Wash.
THERMAL CONDUCTIVITY OF Q-FELT INSULATION AT ELEVATED TEMPERATURES.
Final rept., 1 Apr-15 Aug 64,
by T. W. Eichenberger. 5 Oct 64, 102p D2-81285
Contract AF 33 (615)-1624

Descriptors: (*Thermal insulation, Thermal conductivity), (*Ceramic fibers, Thermal insulation), (*Quartz, Ceramic fibers), High temperature research, Manned spacecraft, Boost-glide vehicles, Reentry vehicles, Physical properties, Mechanical properties, Tables, Thermal properties, Test equipment, Test methods, Heat-resistant materials.

Identifiers: Q-felt, X-20 spacecraft.

The thermal conductivity of Q-felt, a commercial micro-quartz fibrous insulation material, was evaluated. Tests were conducted on several densities each of as received and thermally stabilized material at elevated temperatures and at atmospheric and reduced pressures. Mean test temperatures ranged from 200 to 2560 F and reduced pressures to 0.1 MM/Mercury were used. Curves have been prepared presenting the mean apparent thermal conductivity of both thermally stabilized and un-

stabilized Q-felt as a function of mean temperature, gas pressure and material density. (Author)

AD-641 494 Field 11G
Not available from CFSTI.
Arizona Univ., Tucson. Dept. of Physics.
EFFECT OF HYDROSTATIC PRESSURE ON THE CURIE POINTS OF SEVERAL FERRITES.
Revised ed.,
by C. L. Foiles, and C. T. Tomizuka. 23 Jul 65, 7p
Grant AF-AFOSR-105-63
Proj. AF-9763
Task 976302
AFOSR-66-1745
Revision of manuscript submitted 12 Apr 65.
Availability: Published in Journal of Applied Physics v36 n2 p3839-43 Dec 1965.

Descriptors: (*Ferromagnetic materials, Hydrostatic pressure), Transition temperature, Ferrites, Nickel compounds, Zinc compounds, Gadolinium compounds, Iron compounds, Garnet, Magnetic properties.

The effect of hydrostatic pressure on the Curie temperature T sub c was measured for four members of a Ni-Zn ferrite series (30%, 50%, 80%, and 100% NiO) and for two members of a gadolinium-iron-garnet series (Gd3AlFe4O12 and Gd1.5Y1.5A10.5Fe4.5O12). A transformer technique was used for the measurements with the maximum pressure available being 8 kbar. The Curie temperature showed a linear increase with pressure and the slopes ranged from 0.58 plus or minus 0.05 to 1.16 plus or minus 0.07C/kbar. The approximate Curie points varied from 153C (Gd3AlFe4O12) to 616C (100% NiO ferrite). The samples with T sub c less than 400C were measured in a liquid-pressure system and the others were measured in a gas-pressure system. (Author)

PB-173 368 Field 11G, 13C
CFSTI Prices: HC$8.60 MF$0.75
Texas Highway Dept.
COMPARISON OF AASHO AND TEXAS TEST METHODS AND SPECIFICATIONS FOR FLEXIBLE BASE MATERIALS,
by Chester McDowell. May 66, 78p Rept. no. 48-1F
Proj. HPR-1-1-9-63-48
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Texas, Civil engineering), (*Roads, Materials), (*Materials, Experimental data), Test methods, Construction, Roads, Maintenance, Soils, Soils mechanisms, Plasticity, Sampling, Analysis, Creep.

Identifiers: Highway engineering.

Forty-two samples of various types of flexible base materials were collected from various parts of Texas and processed by splitting each sample into two nearly identical portions, one of which was sent to B.P.R. Laboratory in Washington, D. C., and the other retained in the T.H.D. Laboratory. Small samples of soil binder which were obtained by each laboratory were also exchanged. Each laboratory performed test for soil constants and some sieve size analysis on all samples. From time to time detailed test results were exchanged between the two laboratories. A study of the relation of the soil constants and road performance was also made. This included obtaining records of construction and maintenance data and evaluating road performance. (Author)

AD-641 674 See Field 20F
AD-641 733 See Field 20N
AD-641 734 See Field 20N
NBS-TN-408 See Field 20L
PB-173 411 See Field 13C

11H. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

AD-458 414 Field 11H, 14B, 22B
CFSTI Price: HC$2.00
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
TESTS OF DRY COMPOSITE LUBRICATED BEARINGS FOR USE IN AN AEROSPACE ENVIRONMENTAL CHAMBER,
by T. L. Ridings. Mar 65, 45p AEDC-TR-65-35
Contract AF 49 (600)-1000
Projs. AF-7778, ARO-SM-3503
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Bearings, Lubrication), (*Lubricants, Composite materials), Ball bearings, Roller bearings, Greases, Copper, Halocarbon plastics, Tungsten compounds, Selenides, Silver alloys, Altitude chambers, Test facilities, Space environmental conditions, Theory, Tests, Space simulation chambers.

Identifiers: Teflon.

The report contains the results of a test program set up to determine the operational characteristics of dry composite lubricated bearings. Two different bearing types were tested: Tapered roller bearings and ball bearings. Four dry composite lubricants and two low vapor pressure greases were tested. Results indicate that the dry composite lubricants were more successful when used with ball bearings than when used with tapered roller bearings. All four composite lubricants provided low system torques (40 to 60 lb-in.) under heavy loads (3000 lb/bearing) for the scheduled 100 hours. (Author)

AD-641 307 Field 11H
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
FACTORS AFFECTING THE ENDURANCE OF RUBBED LUBRICANT FILMS OF LAMELLAR SOLIDS.
Technical rept.,
by J. P. Giltrow. Jun 66, 20p TR-66184

Descriptors: (*Lubricants, Wear resistance), Solids, Films, Surface properties, Roughness, Humidity, Chemical properties, Friction, Sulfides, Selenides, Tantalum compounds, Niobium compounds, Tungsten compounds, Molybdenum compounds, Great Britain.

Identifiers: Dry-film lubricants.

Experiments were made, using a pin and ring machine, to measure the influence of surface roughness, humidity and chemical composition on the endurance of rubbed films of lamellar solids. An optimum film life is exhibited on substrates of roughness approximately 30-40 microns in CLA. An environment of high relative humidity during film formation leads to enhanced endurance whilst high humidity during film testing leads to reduced endurance. The coefficients of friction increase with increasing relative humidity of the environment. It is tentatively suggested that the inability of Group VA metal dichalcogenides to lubricate mild and tool steel may be due to their probable non-stoichiometric composition. (Author)

AD-641 369 Field 11H
CFSTI Prices: HC$1.00 MF$0.50
Mechanical Technology, Inc., Latham, N. Y.
PROCESS FLUID LUBRICATION.
Final technical rept.,
by D. E. Dougherty, and C. H. T. Pan. Sep 66, 15p MTI-66TR50
Contract Nonr-3731 (00)

Descriptors: (*Lubrication, *Fluids), Steam, Viscosity, Water, Bearings, Films.

The research program in process fluid lubrication is divided into four functional study tasks: (A) Steam lubrication, (B) Low kinematic viscosity fluids, (C) Materials evaluation for water and steam bearings, and (D) Related analytical studies.

11I. PLASTICS

AD-451 684 Field 11I, 11D, 11B
CFSTI Price: HC$5.00
General Electric Co., Philadelphia, Pa. Missiles and Space Div.
HOLLOW GLASS FIBER REINFORCED LAMINATES.
Final rept., 15 Jun 63-15 Aug 64.
15 Aug 64, 161p
Contract NOw-63-0674-c
Availability: Microfiche only after original copies are exhausted.

Descriptors: (*Laminated plastics, Composite materials), (*Reinforcing materials, Glass), (*Glass textiles, Reinforcing materials), Thermal conductivity, Dielectric properties, Stresses, Tensile properties, Specific heat, Thermal expansion, Epoxy plastics, Ablation, Compressive properties, Strain (Mechanics), Fatigue (Mechanics), Rupture, Elasticity.

Previous studies of hollow glass fiber reinforced plastics have indicated that these composites offer the potential of significant structural weight savings for structures which are design limited by compressive strength or stability considerations or by bending or deflection criteria. This report on the accomplishments of the present program consists of two parts. The first presents the development of new analytical tools for the evaluation of composite performance. Included in this section are analyses relating the thermal expansion coefficients and thermal conductivities of a fibrous composite to those of the constituents. Also, further study of the stresses in the vicinity of a fiber discontinuity are presented. The second phase of the report describes the experimental program including mechanical, thermal and electrical property measurements. Test results are compared with analytical results where possible. The results indicate potential for application of the material to new areas. (Author)

AD-641 666 Field 11I
CFSTI Prices: HC$4.00 MF$1.00
Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
SUBJECT INDEX, BIBLIOGRAPHY, AND CODE DESCRIPTION OF TECHNICAL CONFERENCE PAPERS ON PLASTICS: 5 MARCH 1965 - 10 MARCH 1966,
by Joan B. Titus, and Arnold E. Molzon. Jul 66, 137p PLASTEC-27

Descriptors: (*Plastics, Bibliographies), Symposia, Indexes, Classification, Physical properties, Mechanical properties, Manufacturing methods.

The papers presented at technical conferences on plastic materials and related technology, within a one year period ending 10 March 1966 are listed, indexed by subject, and compiled by material, type of technical data, and military application. Over 690 papers from 20 conferences are covered. Included are a bibliography, author index, summary of new material developments, and a list of applications and programs sponsored by the Department of Defense and the National Aeronautics and Space Administration. (Author)

N66-38139 Field 11I
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
EVALUATION OF SEVERAL SILICONE, PHENOLIC, AND EXPOXY BASE HEAT-

SHIELD MATERIALS AT VARIOUS HEAT-TRANSFER RATES AND DYNAMIC PRESSURES.
by A. J. Chapman. Oct 66, 58p NASA-TN-D-3619
Contract 124-08-03-10-23

Descriptors: *Ablating material, *Dynamic pressure, *Epoxy resin, *Heat transfer, *Phenol resin, *Silicone resin, Ablation, Arc, Dynamic, Elastomer, Electric, Epoxy, Fiberglass, Gas, Heat, Honeycomb, Phenol, Pressure, Rate, Resin, Rigid, Shield, Silicone, Test.

For abstract, see STAR 04 23.

AD-484 442 See Field 13M

AD-641 308 See Field 7D

AD-641 339 See Field 5A

AD-641 797 See Field 7C

AD-641 867 See Field 7D

AD-641 872 See Field 11A

AD-641 873 See Field 7C

11J. RUBBERS

AD-641 693 Field 11J, 20K
Not available from CFSTI.
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ON THE COMPLEX POISSON'S RATIO OF A URETHANE RUBBER COMPOUND.
Physical sciences research papers,
by Ker C. Thomson. 10 Mar 66, 9p AFCRL-PSRP-269, AFCRL-66-660
Proj. AF-7639
Task 763908
Availability: Published in Journal of Applied Science v10 p1133-6 1966.

Descriptors: (*Isocyanate plastics, *Viscoelasticity), (*Elastomers, Viscoelasticity), Synthetic rubber, Creep, Mechanical waves, Propagation, Modulus of elasticity.

Identifiers: Poisson ratio.

The complex Poisson's ratio of a urethane rubber compound was determined for frequencies up to 700 cps. It is shown that the assumption made by earlier workers using this material, that Poisson's ratio is a numerical constant slightly less than 1/2, while approximately correct at low (creep) frequencies is definitely invalid in certain more elevated frequency bands. (Author)

PB-173 454 Field 11J
CFSTI Prices: HC$3.00 MF$0.75
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A STUDY OF TIRE-SURFACE INTERACTION FOR THE CASE OF ROLLING ON A WET SURFACE.
Final rept.,
by Desmond F. Moore. 1965, 85p CAL-YD-1969-V-2
Contract CPR-11-1058
VOL. I see PB-173 328.

Descriptors: (*Scientific research, Tires), (*Tires, Pavements), Surfaces, Surface properties, Roughness, Velocity, Skin friction, Test equipment, Meters, Modulus of elasticity, Damping.

Identifiers: Tire draping.

The interim report (PB-173 328) comprised the building, calibration and use of the outflow meter to characterize pavement drainage; the construction and use of a profile measuring device to check the results obtained with the outflow meter in the case of random surfaces; and the assignment of drainage numbers to sandpaper and concrete surfaces. This final report fulfills the remaining objectives of the study. A considerable section is devoted to draping studies using the apparatus described in the first report. It will be recalled that the rubber elements traversing the 'contact' area (for the case of the rolling of a tire on a wet pavement) proceed to drape themselves about the larger asperities in the transition zone and at a rate which is a function chiefly of rolling velocity. Both static and dynamic draping is considered for single and multiple asperities and with varying load. Most of the experiments are confined to spherical asperities, but conical shapes are also considered for each type of rubber. The damping properties and the dynamic pressure sustained by each variety of rubber are calculated and shown as functions of time. (Author)

AD-641 308 See Field 7D

11L. WOOD AND PAPER PRODUCTS

AD-641 904 Field 11L, 13H, 14B
CFSTI Prices: HC$1.00 MF$0.50
Puget Sound Naval Shipyard, Bremerton, Wash. Material Labs.
WHITE OAK LAMINATES COMPARISON OF 12-DAY AND 3-HOUR DELAMINATION TEST RESULTS.
Development rept.,
by E. Stahl. Jan 60, 19p E-285C

Descriptors: (*Laminates, Wood), (*Quality control, Laminates), Test methods, Degradation, Joints, Aging (Materials), Specifications, Military requirements.

Correlation studies between the 12-day cyclical exposure test of Specification MIL-W-0015154B and a proposed 3-hour delamination test were made on white oak face laminates. Results indicated the 3-hour test method to be suitable for quality control purposes. A limited number of values were also obtained on scarf joints. (Author)

PB-173 469 Field 11L, 2F
CFSTI Prices: HC$2.60 MF$0.50
Department of Forestry, Vancouver (British Columbia). Forest Products Lab.
PROPERTIES AND UTILIZATION OF LODGEPOLE PINE IN WESTERN CANADA.
by F. W. Guernsey, and J. Dobie. 1966, 23p Pub-1143

Descriptors: (*Trees, Economics), (*British Columbia, Trees), (*Wood, British Columbia), Forestry, Industrial production, Material forming, Mechanical properties, Chemical properties, Wood pulp, Manufacturing methods, Canada.

Identifiers: Pinus contorta.

In recent years advances in logging and milling technology have made the harvesting of small trees more economically attractive than previously and in interior British Columbia the annual cut of lodgepole pine increased by 300 per cent in the period from 1954-64. Lodgepole pine is being used and is well suited for a wide variety of products, among them being lumber, pulp, railway ties, utility poles, mining timbers and assorted minor uses such as fence-posts, orchard props, corral rails and Christmas trees. Historically the major uses for lodgepole have been for railway ties and mine timbers, but in recent years in Alberta and B. C. its use as a lumber species has increased to the extent now of about 70 per cent of its utilization. Most of the lumber produced from lodgepole pine in western Canada is dimension lumber and is mixed and sold with that of spruce and balsam. Its strength properties, however, are similar to jack pine and superior to both spruce and balsam. It has been found suitable for pulping and the expansion of the pulp industry in the interior of British Columbia with attendant increases in population and services should contribute considerably to continued growth in the utilization of this species for pulp and lumber. (Author)

PB-173 470 Field 11L
CFSTI Prices: HC$3.60 MF$0.50
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Forest Products.
THE MECHANICAL PROPERTIES OF 81 NEW GUINEA TIMBERS.
Technical paper,
by E. Bolza, and N. H. Kloot. 26 Jan 66, 39p TP-41

Descriptors: (*Wood, Mechanical properties), (*New Guinea, Wood), Tensile properties, Compressive properties, Hardness, Torsion, Density, Bending, Shear stresses, Impact shock, Australia.

Mechanical properties are tabulated for 81 New Guinea timbers. The text comprises explanatory notes to facilitate use of the data by wood technologists. (Author)

PB-173 506 Field 11L
CFSTI Prices: HC$4.00 MF$0.75
Diehm (R. A.), Kalamazoo, Mich.
THE UTILIZATION OF SURPLUS WOODS FOR PULP AND PAPER IN THE FIVE COUNTY AREA COMPOSED OF ASHLAND, PAYFIELD, DOUGLAS, IRON, AND PRICE COUNTIES OF NORTHERN WISCONSIN.
1 Dec 65, 123p

Descriptors: (*Paper industry, *Wisconsin), Wood, Wood pulp, Feasibility studies, Economics, Forestry.

The purpose of the study is to determine the feasibility of establishing a pulp and paper mill in the area composed of Ashland, Bayfield, Douglas, Iron, and Price counties of northern Wisconsin. The basic objectives of the study are (1) to identify the type of pulp and paper products that can be produced in the area, (2) the market possibilities for such products, and (3) to evaluate and describe the economic feasibility, capacity, and operating requirements and financial prospects for such operations. The research, investigation, analysis, data, and documentation is sufficiently comprehensive to provide a guide for an investment decision in the facility recommended. (Author)

PB-173 475 See Field 13M

12A. MATHEMATICS AND STATISTICS

AD-405 338 Field 12A
CFSTI Price: HC$4.60
Stanford Research Inst., Menlo Park, Calif.
SOME ADDITIONAL THEOREMS FOR A NON-STATIONARY STOCHASTIC PROCESS WITH A CONTINUOUS, NON-RANDOM, TIME-DEPENDENT COMPONENT,
by R. C. McCarty, G. W. Evans, II, G. L. Sutherland, and Z. W. Birnbaum. Apr 63, 41p Technical rept. TR-12
Contracts SD-103, ARPA order-281-62
Proj. SR1-3857

Descriptors: (*Stochastic processes, Theory), (*Statistical functions, Integral equals), Transformations (Mathematics), Complex variables, Integral transforms.

In Technical Report 4,1 several definitions and theorems were presented to aid in the analysis of a sub-class of non-stationary processes consisting

of a random component and a continuous non-random function of time, each component defined over the same finite time interval. This report supplements the results of Technical Report 4 both by extending the sub-class of non-stationary processes under consideration and by including additional theorems.

AD-641 322 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
AN ALGORITHM FOR CLASSIFYING ERGODIC MATRICES.
Management sciences research rept.,
by Gerald L. Thompson. Sep 66, 15p MSRR-83
Contract Nonr-760 (24)
Proj. NR-047-048

Descriptors: (*Algorithms, *Matrix algebra), (*Measure theory, Matrix algebra), Probability, Graphics.

An algorithm is derived for determining whether a given ergodic matrix is regular or cyclic, and for putting it in canonical form in the latter case. It requires very little numerical computation and is suitable for hand use even for fairly large matrices. For large matrices, the corresponding program is considerably faster than previous ones. The paper also contains elementary independent proofs of several known results on ergodic matrices. (Author)

AD-641 329 Field 12A
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
EQUILIBRIUM SYSTEMS FOR STABLE PROCESSES,
by Sidney C. Port. Sep 66, 29p RM-4964-PR
Contract AF 49 (638) 1700
See also AD-630 343.

Descriptors: (*Statistical processes, Measure theory), Probability, Set theory.

Results are presented of an investigation of several phenomena connected with the movement of particles through a compact subset B of d-dimensional Euclidean space in a system of infinitely many particles in statistical equilibrium, where each particle moves independently of the others according to the laws of the same symmetric stable process. (Author)

AD-641 341 Field 12A
CFSTI Prices: HC$1.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A RECURSION RELATION FOR COMPUTING LEAST-SQUARE POLYNOMIALS OVER MOVING-ARCS,
by George R. Trimble, Jr. Nov 51, 15p Rept. no. BRL-778
Proj. TB3-0007K

Descriptors: (*Polynomials, *Least squares method), Numerical analysis, Series, Mathematical logic.

The smoothing of data may be accomplished on automatic computing machines such as the IBM Card-Programmed Electronic Calculator or the Eniac by fitting least-square polynomials over moving-arcs. Essentially it consists of fitting least-square polynomials successively over finite subsets of a given finite set of real points in a plane. The difficulty with the procedure has been in the small number of storage registers available in the machines. By means of the recursion relation between coefficients of successive least-square polynomials as derived in the report, the number of required storage registers is materially reduced, making practicable the application of the IBM Card-Programmed Electronic Calculator or the Eniac to this type of problem. (Author)

AD-641 368 Field 12A
CFSTI Prices: HC$2.00 MF$0.50
Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
ABEL'S EQUATION AND THE CAUCHY INTEGRAL EQUATION OF THE SECOND KIND.
Technical rept.,
by Arthur S. Peters. Oct 66, 28p IMM NYU-352
Contract Nonr-285 (55)
Proj. NR-062-160

Descriptors: (*Integral equations, Theory), Transformations (Mathematics), Integration.

Identifiers: Abel's equation.

The report shows that a Cauchy singular integral equation of the second kind can be solved by reducing it to Abel's integral equation. The reduction yields a new formula for the solution of the Cauchy equation. (Author)

AD-641 397 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
CONSTRUCTION OF THE UNIQUE SATURATED RESOLUTION V DESIGN IN 256 RUNS.
Technical rept.,
by Norman R. Draper, and Toby J. Mitchell. Aug 66, 20p TR-81
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Experimental design, *Combinatorial analysis).

The paper investigates the problem of how many variables can be accommodated in a 2 sub v k-p design in 256 runs. The problem is solved through the application of methods given by the authors in a previous paper (Draper and Mitchell (1966)) to the particular case R = 5, q = k - p = 8. The problem of obtaining optimally blocked designs for each value of k is also solved. (Author)

AD-641 398 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
ASYMPTOTIC EFFICIENCY OF THE KOLMOGOROV - SMIRNOV TEST.
Technical rept.,
by Jerome Klotz. Aug 66, 17p TR-83
Grant AF-AFOSR-1158-66

Descriptors: (*Statistical tests, Effectiveness).

Identifiers: Kolmogorov-Smirnov test.

A simple derivation of asymptotic efficiency for the Kolmogorov - Smirnov statistic is given and evaluated for normal location and normal scale alternatives. Using equal samples to simplify the derivation, the limiting efficiency is obtained by letting the type I error alpha go to zero while the type II error goes to beta, 0 < beta < 1. For symmetric location alternatives, the efficiency is the same as that obtained for the Mood and Brown median test. Limits of relative efficiencies for alternatives which approach the null hypothesis are 2/pi for normal location alternatives and 1/ (pi (E)) for normal scale alternatives. (Author)

AD-641 445 Field 12A
Not available from CFSTI.
Rensselaer Polytechnic Inst., Troy, N. Y.
ON THE REALIZATION OF THE EIGENVALUES OF INTEGRAL EQUATIONS WHOSE KERNELS ARE ENTIRE OR MEROMORPHIC IN THE EIGENVALUE PARAMETER.
Revised ed.,
by Bruce E. Goodwin. 1 Jun 65, 24p
Grant AF-AFOSR-182-63
Proj. AF-9749
Task 974901
AFOSR-66-1218
Revision of manuscript submitted 1 Apr 65.
Availability: Published in J. Siam Appl. Math. v14 n1 p65-85 Jan 1966.

Descriptors: (*Integral equations, Complex variables), Functions.

In the paper an idea based on some formulae of Spiegel is used to extend the classical formulae relating infinite sums of powers of the reciprocals of eigenvalues of Fredholm integral equations to similar formulae when the kernel depends on the eigenvalues in various ways. The eigenvalue equations obtained represent the principal contributions to the paper. Results were applied to nonsymmetric kernels, and to a rotating blade. Results for entire kernels were used to investigate the symmetrizations of nonsymmetric kernels. Sufficient conditions were given for symmetrized kernels to have only real eigenvalues. It was also shown that the symmetrizations of Kowalewski kernels and Volterra kernels have no eigenvalues. (Author)

AD-641 453 Field 12A
Not available from CFSTI.
Oklahoma Univ., Norman.
SUFFICIENT CONDITIONS FOR GLOBAL EXTREMA IN THE CALCULUS OF VARIATIONS,
by George M. Ewing. 3 Mar 65, 7p
Grant AF-AFOSR-211-63
Proj. AF-9749
Task 974902
AFOSR-66-0036
Availability: Published in Journal of the Astronautical Sciences p102-5.

Descriptors: (*Theorems, *Calculus of variations), Set theory, Functional analysis, Complex variables, Convex sets.

This paper exhibits two types of sufficiency theorems, of the following kind: Given a real-valued function J on a suitable class Y of vector-functions y = (y1,..., yn), show that a particular y sub o in Y satisfies the relation: J (y sub o) < J (y) for all y E Y. (Author)

AD-641 457 Field 12A
Not available from CFSTI.
Colorado State Univ., Fort Collins. Dept. of Mathematics and Statistics.
DETERMINANTAL REPRESENTATIONS OF RECURSION RELATIONS FOR CERTAIN ORTHOGONAL POLYNOMIALS,
by F. Max Stein, M. S. Henry, and L. G. King. 1966, 6p
Grant AF-AFOSR-185-63
Proj. AF-9749
Task 974901
AFOSR-66-1395
Prepared in cooperation with Pacific Northwest Labs., Richland, Wash.
Availability: Published in American Mathematical Monthly v73 n4 pt1 p382-5 Apr 1966.

Descriptors: (*Polynomials, *Determinants), Matrix algebra, Mathematical logic.

This note shows that recursion relations for four types of orthogonal polynomials may be derived from the determinant representation of orthogonal polynomials of Pandres in the MONTHLY V. 64 (1957) pp. 566-572 and V. 67 (1960) pp. 658-659, and may be expressed in terms of these determinants. Also shown is the connection between the various polynomials and their determinantal representation so that the usual form of the recursion relations can be readily obtained. (Author)

AD-641 460 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Hebrew Univ., Jerusalem (Israel). Dept. of Mathematics.
MINIMAL SEPARATING COLLECTIONS.
Research memo.,
by Bezalel Peleg. Aug 66, 10p RM-21
Contract N62558-4355
Proj. NR-047-045

Rept. on Research Program in Game Theory and Mathematical Economics.

Descriptors: (*Game theory, *Set theory), Graphics, Israel.

The knowledge of minimal separating collections is important in connection with the computation of the kernel of a cooperative game. This paper determines the maximum number of sets in a minimal separating collection. (Author)

AD-641 464 **Field 12A**
Not available from CFSTI.
Massachusetts Inst. of Tech., Cambridge.
FACTORIZATION THEOREMS FOR BANACH ALGEBRAS,
by Alessandro Figa-Talamanca, and Philip C. Curtis, Jr. 1966, 18p
Grant AF-AFOSR-335-63
AFOSR-66-0676
Prepared in cooperation with California Univ., Los Angeles.
Availability: Published in Function Algebras p169-85 1966.

Descriptors: (*Algebras, *Functional analysis), (*Theorems, Algebras), Potential theory.

Identifiers: Factorization.

AD-641 465 **Field 12A**
Not available from CFSTI.
Massachusetts Inst. of Tech., Cambridge. Dept. of Mathematics.
REGULAR BOUNDARY POINTS IN MARKOV CHAINS,
by A. W. Knapp. 2 Aug 65, 9p
Grant AF-AFOSR-335-63
Proj. AF-9749
Task 974902
AFOSR-66-1538
Availability: Published in Proceedings of the American Mathematical Society v17 n2 p435-40 Apr 1966.

Descriptors: (*Probability, Theory), Measure theory, Potential theory, Stochastic processes, Boundary value problems.

In the present work the author studies the nature of the set of regular boundary points in Markov chains. If P is the transition matrix of a transient Markov chain, then a function (column vector) h is harmonic if it has the mean value property h=Ph, superharmonic if h Ph. Doob and Hunt have developed a Martin boundary theory for such a chain and they showed that, in terms of the space they construct, there is the usual sort of Poisson-integral representation theorem for the integrable nonnegative superharmonic functions. In this framework two questions are asked: Is the set of regular points a Borel set. Is the set necessarily nonempty. The answers are yes to the first and no to the second. (Author)

AD-641 466 **Field 12A**
Not available from CFSTI.
Massachusetts Inst. of Tech., Cambridge. Dept. of Mathematics.
A THEOREM OF LITTLEWOOD AND LACUNARY SERIES FOR COMPACT GROUPS,
by Alessandro Figa-Talamanca, and Daniel Rider. 1 Apr 65, 13p
Grant AF-AFOSR-335-63
Proj. AF-9749
Task 974902
AFOSR-66-0761
Availability: Published in Pacific Journal of Mathematics v16 n3 p505-14 1966.

Descriptors: (*Theorems, *Series), (*Groups (Mathematics), Series), Transformations (Mathematics), Fourier analysis.

Let G be a compact group and f E L2 (G). The authors prove that given p< infinity there exists a unitary transformation U of L2 (G) into L2 (G), which commutes with left translations and such that Uf E LP. The proof is based on techniques developed by S. Helgason for a similar question. The result stated above, which is an extension of a theorem of Littlewood for the unit circle is then applied to the study of lacunary Fourier series. (Author)

AD-641 491 **Field 12A**
Not available from CFSTI.
West Virginia Univ., Morgantown. Dept. of Aerospace Engineering.
THE RELATION BETWEEN ABSOLUTE ITERATION AND NEWTON'S METHOD,
by William Squire. 1965, 6p
Grant AF-AFOSR-113-63
Proj. AF-9749
Task 974901
AFOSR-66-1508
Availability: Published in Proceedings of the West Virginia Academy of Science v37 p262-5 1965.

Descriptors: (*Iterative methods, Analysis), (*Equations, Iterative methods), Optimization.

Identifiers: Newton's method.

Kowel's iterative method for solving transcendental equations is modified by introducing an adjustable parameter. The solution of an example shows considerable improvement. It is then shown that when the approximate value is sufficiently close to the root the method is equivalent to Newton's method. (Author)

AD-641 510 **Field 12A**
Not available from CFSTI.
Institute for Advanced Study, Princeton, N. J.
THE REDUCTION OF A FUNCTION NEAR A NONDEGENERATE CRITICAL POINT,
by Marston Morse. 1965, 7p
Grant AF-AFOSR-357-63
Proj. AF-9749
Task 974902
AFOSR-66-0670
Availability: Published in Proceedings of the National Academy of Sciences v54 n6 p1759-63 Dec 1965.

Descriptors: (*Functional analysis, *Topology), Mapping (Transformations).

AD-641 512 **Field 12A**
Not available from CFSTI.
Arizona State Univ., Tempe. Dept. of Mathematics.
COVERING THEOREMS FOR UNIVALENT FUNCTIONS,
by E. P. Merkes, and W. T. Scott. 18 Aug 65, 10p
Grant AF-AFOSR-371-63
Proj. AF-9749
Task 974902
AFOSR-66-1213
Prepared in cooperation with Cincinnati Univ., Ohio.
Availability: Published in Michigan Mathematical Journal v13 p41-7 1966.

Descriptors: (*Theorems, *Functions), Topology.

AD-641 514 **Field 12A**
Not available from CFSTI.
Institute for Advanced Study, Princeton, N. J.
A MODEL NON-DEGENERATE FUNCTION,
by W. Huebsch, and Marston Morse. Sep 64, 36p
Grants AF-AFOSR-357-63, NSF-G19884
Proj. AF-9749
Task 974902
AFOSR-66-0671
Prepared in cooperation with Western Reserve Univ., Cleveland, Ohio. Presented at the Colloquium on Global Differential Geometry at Bucharest (Romania), Jun 30-Jul 4, 1964.
Availability: Published in Revue Roumanie de Mathematiques Pures et Appliquees v10 n6 p691-722 1965.

Descriptors: (*Functional analysis, *Topology), Set theory, Model theory, Differential geometry, Mapping (Transformations).

Let M be a connected, oriented, differentiable n-manifold (n>2), f be a non-degenerate function on M, and w,w be two critical points of f with indices k-1 and k and f-values 0 and 1 respectively. The paper deals with the problem of the existence of an open subset N of M which contains w and w and whose closure contains no other critical points of f and of a non-degenerate function f on M without critical points on N and such that f= f on M-N. (Author)

AD-641 520 **Field 12A**
Not available from CFSTI.
Minnesota Univ., Minneapolis. School of Mathematics.
REMOVABLE SINGULARITIES OF SOLUTIONS OF ELLIPTIC EQUATIONS. II,
by James Serrin. 19 Jun 65, 9p
Grant AF-AFOSR-372-63
Proj. AF-9749
Task 974902
AFOSR-66-0265
See also AD-630 896.
Availability: Published in Archive for Rational Mechanics and Analysis v20 n3 p163-9 1965.

Descriptors: (*Partial differential equations, Boundary value problems), Measure theory, Set theory.

AD-641 521 **Field 12A**
Not available from CFSTI.
Minnesota Univ., Minneapolis. School of Mathematics.
ISOLATED SINGULARITIES OF SOLUTIONS OF QUASI-LINEAR EQUATIONS,
by James Serrin. 25 Aug 64, 26p
Grant AF-AFOSR-372-63
Proj. AF-9749
Task 974902
AFOSR-66-0259
Availability: Published in Acta Mathematica v113 p219-40 1965.

Descriptors: (*Partial differential equations, Theory), Calculus of variations, Potential theory, Boundary value problems.

Identifiers: Singularity.

AD-641 526 **Field 12A**
Not available from CFSTI.
Harvard Univ., Cambridge, Mass.
CONVOLUTION TRANSFORMS WHOSE INVERSION FUNCTIONS HAVE COMPLEX ROOTS,
by John Dauns, and David V. Widder. 18 Mar 64, 20p
Grant AF-AFOSR-393-63
Proj. AF-9749
Task 974902
AFOSR-66-0672
Availability: Published in Pacific Journal of Mathematics v15 n2 p427-42 1965.

Descriptors: (*Integral transforms, *Functions), Complex variables, Asymptotic series, Topology, Theory.

The paper proves the equation E (D)f (X) = (X) when the roots of E (s) are allowed to be genuinely remote from the real axis.

AD-641 528 **Field 12A**
Not available from CFSTI.
British Columbia Univ., Vancouver.
DOMAIN PERTURBATIONS OF THE BIHARMONIC OPERATOR,

by C. A. Swanson. 13 Oct 64, 15p
Grant AF-AFOSR-379-63
Proj. AF-9749
Task 974901
AFOSR-66-0030
Availability: Published in Can J Math v17 p1053-63 1965.

Descriptors: (*Perturbation theory, *Operators (Mathematics)), Potential theory, Boundary value problems, Calculus of variations, Matrix algebra.

The purpose of the work is to obtain asymptotic variational formulae for eigenvalues and eigenfunctions under the deformation of removing an E-disk and adjoining additional boundary conditions on the new boundary component thereby introduced, valid on a positive interval 0<E<E sub 0.

AD-641 529 **Field 12A**
Not available from CFSTI.
British Columbia Univ., Vancouver.
COMPARISON THEOREMS FOR ELLIPTIC DIFFERENTIAL EQUATIONS,
by Colin Clark, and C. A. Swanson. 24 Aug 64, 10p
Grant AF-AFOSR-379-63
Proj. AF-9749
Task 974901
AFOSR-66-0210
Availability: Published in Proceedings of the American Mathematical Society v16 n5 p886-90 Oct 1965.

Descriptors: (*Theorems, *Partial differential equations), Calculus of variations, Green's function, Identities.

In recent years the classical Sturm-Picone comparison theorem for a pair of second order ordinary differential equations has been generalized in two directions. First, Hartman and Wintner have extended the theorem to self-adjoint elliptic equations in n dimensions. On the other hand, Leighton has shown in the case n=1 that the usual pointwise inequalities for the coefficients can be replaced by a more general inequality. The purpose of this note is to extend Leighton's result to self-adjoint elliptic equations. The Hartman-Wintner results is a corollary of the main theorem. An example to show is given that the result is actually stronger. An interesting feature is the simplicity of the proof as compared to that of Hartman and Wintner or the recent proof of Kreith.

AD-641 530 **Field 12A**
Not available from CFSTI.
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
REMARKS ON A GENERALIZATION OF BANACH'S PRINCIPLE OF CONTRACTION MAPPINGS,
by J. B. Diaz, Sherwood C. Chu, and R. F. Duffin. 1965, 9p
Grant AF-AFOSR-400-63
Proj. AF-9749
Task 974901
AFOSR-66-0561
Availability: Published in Journal of Mathematical Analysis and Applications v11 n1-3 p440-6 Jul 1965.

Descriptors: (*Functional analysis, *Mapping (Transformations)), Theory.

Identifiers: Contraction mapping.

A generalization of Banach's principle of contraction mappings appears in a book of Kolmogorov and Fomin. The purpose of this note is to simplify the proof of the generalization in the book: and to obtain, by proceeding along the lines of the simpler argument, several improvements to the above mentioned generalization (thereby showing that this generalization is merely a special case of an elementary fact).

AD-641 531 **Field 12A**
Not available from CFSTI.
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
ON THE DIFFERENCE EQUATION y (x + 1) -- y (x) = f(x),
by Sherwood C. Chu, and J. B. Diaz. 1965, 6p
Grant AF-AFOSR-400-63
Proj. AF-9749
Task 974901
AFOSR-66-0562
Availability: Published in Journal of Mathematical Analysis and Applications v11 n1-3 p478-81 Jul 1965.

Descriptors: (*Difference equations, Theory), Functions.

The following problem was considered by Euler to find a solution y (x) of the difference equation y (x + 1) -- 5 (x) = f (x). Euler derived a formula for a solution of the equation which may be valid when the function f (x) has period one and is expandable in a Fourier series. The purpose of this note is to solve the equation in an extremely simple manner for all functions f (x) of period one and to apply the basic idea involved to the solution of other difference equations. A brief resume of Euler's method of solution is given, for the purpose of comparison.

AD-641 532 **Field 12A, 20D**
Not available from CFSTI.
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
SOME APPLICATIONS OF THE NEW MAXIMUM-MINIMUM THEORY OF EIGENVALUES,
by Alexander Weinstein. 1965, 11p
Grant AF-AFOSR-400-63
Proj. AF-9749
Task 974901
AFOSR-66-0111
Availability: Published in Journal of Mathematical Analysis and Applications v12 n1 p58-64 Aug 1965.

Descriptors: (*Calculus of variations, Matrix algebra), Functional analysis, Vibration, Elasticity, Partial differential equations, Incompressible flow.

Identifiers: Eigenvalues.

The object of the paper is to give some applications of an improved maximum-minimum theory of eigenvalues as recently developed by the present author. Among other applications he discusses problems which originated in the theory of the stability of solutions of the Navier-Stokes equations and the vibrations of an incompressible elastic body.

AD-641 534 **Field 12A**
Not available from CFSTI.
California Univ., Riverside.
ESTIMATION OF NON-UNIQUE QUANTILES.
Revised ed.,
by Dorian Eeldman, and Howard G. Tucker. 2 Nov 65, 10p
Grant AF-AFOSR-851-65
Proj. AF-9749
Task 974901
AFOSR-66-1197
Revision of manuscript submitted 9 Aug 65. Prepared in cooperation with Michigan State Univ.
Availability: Published in The Annals of Mathematical Statistics v37 n2 p451-7 Apr 1966.

Descriptors: (*Distribution functions, *Measure theory), Stochastic processes.

Identifiers: Quantiles.

The paper is concerned with consistent estimates of a quantile of a distribution function when the quantile is not unique. To be more precise, since the quantile is assumed not to be unique, the authors are concerned with obtaining a consistent estimate of the smallest pth quantile for a fixed p ($0 < p < 1$), and from this procedure they can estimate the largest pth quantile.

AD-641 537 **Field 12A**
Not available from CFSTI.
Yale Univ., New Haven, Conn. Dept. of Mathematics.
ON SOME RESTRICTION ALGEBRAS,
by E. L. Stout. 1966, 9p
Grant AF-AFOSR-407-63
Proj. AF-9749
Task 974902
AFOSR-66-0674
Availability: Published in Function Algebras p6-11 1966.

Descriptors: (*Algebras, Set theory), (*Functions, Algebras), Measure theory.

AD-641 545 **Field 12A**
Not available from CFSTI.
Minnesota Univ., Minneapolis.
ON A CLASS OF ADMISSIBLE PARTITIONS: Revised ed.,
by T. Cacoullos. 7 Jun 65, 9p
Grant AF-AFOSR-885-65
Proj. AF-9749
Task 974902
AFOSR-66-1836
Revision of manuscript submitted 7 Dec 64.
Availability: Published in The Annals of Mathematical Statistics v37 n1 p189-95 Feb 1966.

Descriptors: (*Combinatorial analysis, *Decision theory), Statistical functions.

The present paper extends a previous result of T. Cacoullos in 'Comparing Mahalanobia Distances I: Comparing distances between k known normal populations and another unknown.' (Sankhya Ser. A 27, 1-22), concerning 'topothetical' problems, a certain family of translations and a certain minimax partition, to the case of arbitrary probability contents for conical regions. It also shows how the corresponding partitions are related to classes of admissible partitions for a family of classification and topothetical problems relating to the normal mean. In addition, several problems which have been extensively studied in the statistical literature emerge as special cases of the present general topothetical problem. (Author)

AD-641 554 **Field 12A**
Not available from CFSTI.
California Univ., Santa Barbara. Dept. of Mathematics.
A SUBDETERMINANT INEQUALITY,
by Marvin Marcus, and Henryk Minc. 27 Aug 64, 7p
Grants AF-AFOSR-432-63, NSF-GP-1085
Proj. AF-9749
Task 974901
AFOSR-66-0668
Availability: Published in Pacific Journal of Mathematics v 15 n3 p921-4 1965.

Descriptors: (*Inequalities, *Determinants), (*Matrix algebra, Inequalities), Theory.

Let A be an n-square positive semi-definite hermitian matrix and let D sub m (A) denote the maximum of all order m principal subdeterminants of A. In this note the authors prove the inequality (D sub m (A))1/m < or = (Dsub m + 1 (A))1/ (m + 1), m = 1,..., n - 1, and discuss in detail the case of equality. This result is closely related to Newton's and Szasz's inequalities. (Author)

AD-641 556 **Field 12A**
Not available from CFSTI.
Duke Univ., Durham, N. C. Dept. of Mathematics.

ON THE NON-EXISTENCE OF L SQUARE SOLUTIONS OF A CLASS OF NON-LINEAR DIFFERENTIAL EQUATIONS,
by J. Burlak. 2 Oct 64, 14p
Grant AF-AFOSR-435-63
Proj. AF-9749
Task 974901
AFOSR-66-1351
Availability: Published in Proceedings of the Edinburgh Mathematical Society v14pt 4 Ser2 p257-68 Dec 1965.

Descriptors: (*Nonlinear differential equations, *Functional analysis), Theory, Integration.

The purpose of this paper is to obtain properties of solutions of the mm-linear differential equation y to the eleventh power + f (x) g (y) = 0. In particular, conditions are established under which solutions of the differential equation above fail to be of class L square.

AD-641 576 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana.
MEASURE ALGEBRAS AND SPECTRAL REPRESENTATIONS.
Technical rept.,
by W. Fairchild. May 66, 27p
Contract DA-31-124-ARO (D)-288
Proj. DA-20014501B14C
AROD-5254:10

Descriptors: (*Algebras, *Measure theory), (*Functional analysis, Measure theory), Topology.

Identifiers: Spectral theory.

Spectral families of measures and a spectral representation theorem are presented and examined. (Author)

AD-641 628 **Field 12A, 12B**
Not available from CFSTI.
Society for Industrial and Applied Mathematics, Philadelphia, Pa.
JOURNAL OF THE SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS, SERIES A CONTROL, VOL. 3, NO. 2.
1965, 186p
Grant AF-AFOSR-527-64
Proj. AF-9749
Task 974901
AFOSR-66-0013
See also AD-637 993.
Availability: SIAM Publications, 33 South 17th St., Philadelphia, Penn. 19103 $10.50 per volume.

Descriptors: (*Periodicals, *Mathematics), (*Control, Mathematics), Control systems, Calculus of variations, Automata, Nonlinear differential equations, Algorithms, Fuel consumption.

Identifiers: Applied mathematics.

Contents: The Problem of Bounded Space Coordinates as a Problem of Hestenes, by T. Guinn; An Extended Pontryagin Principle for Control Systems Whose Control Laws Contain Measures, by Raymond W. Rishel; A Common Framework for Automata Theory and Control Theory, by Michael A. Arbib; The Generalized Lienard Equation, by T. A. Burton; Optimal Control Theory for Nonlinear Vector Differential Equations Containing Measures, by W. W. Schmaedeke; Pseudo-Convex Functions, by O. L. Mangasarian; Optimal Control, Inequality State Constraints, and the Generalized Newton-Raphson Algorithm, by Robert McGill; Minimization of Functionals With Equality Constraints, by E. K. Blum; A General Theory of Minimum-Fuel Space Trajectories, by Lucien W. Neustadt.

AD-641 629 **Field 12A**
Not available from CFSTI.
Chicago Univ., Ill. Dept. of Mathematics.
AN ELEMENTARY THEORY OF THE CATEGORY OF SETS,
by F. William Lawvere. 26 Oct 64, 9p
Grant AF-AFOSR-520-64
Proj. AF-9749
Task 974902
AFOSR-66-0033
Availability: Published in Proceedings of the National Academy of Sciences v52 n6 p1506-11 Dec 1964.

Descriptors: (*Set theory, *Mapping (Transformations)), Number theory, Topology, Algebra, Metamathematics.

The author adjoins eight first-order axioms to the usual first-order theory of an abstract Eilenberg-Mac Lane category to obtain an elementary theory with the following properties: (a) There is essentially only one category which satisfies these eight axioms together with the additional (nonelementary) axiom of completeness, namely, the category 8 of sets and mappings. Thus his theory distinguishes 8 structurally from other complete categories, such as those of topological spaces, groups, rings, partially ordered sets, etc. (b) The theory provides a foundation for number theory, analysis, and much of algebra and topology even though no relation E with the traditional properties can be defined. Thus he seems to have partially demonstrated that even in foundations, not Substance but invariant Form is the carrier of the relevant mathematical information.

AD-641 651 **Field 12A, 20K**
CFSTI Prices: HC$1.00 MF$0.50
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
ON THE UNIQUENESS OF THE SOLUTION TO ELASTOSTATIC BOUNDARY-VALUE PROBLEMS FOR THE HALF-SPACE.
Technical rept.,
by M. J. Turteltaub, and Eli Sternberg. Oct 66, 20p TR-8
Contract Nonr-220 (58)
Proj. NR-064-431

Descriptors: (*Boundary value problems, Theorems), (*Elasticity, Boundary value problems), Statics.

Identifiers: Uniqueness theorem.

Uniqueness theorems are established appropriate to the classical elastostatic boundary-value problem for a half-space under given surface displacements or surface tractions. These theorems assure the uniqueness of the solution in the absence of artificial apriori requirements concerning its behavior at infinity. (Author)

AD-641 667 **Field 12A, 9B**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE TERMINATION OF CERTAIN ITERATIVE PROCESSES,
by R. M. Needham. Nov 66, 11p RM-5188-PR
Contract AF 49 (638)-1700

Descriptors: (*Iterative methods, Classification), Automation, Set theory, Data processing systems.

Identifiers: Botryology.

This note demonstrates that a certain class of iterative processes must terminate. The processes in question arise mostly in automatic classification (or botryology as it is sometimes called), and are used for finding clusters of points or objects in a wide variety of spaces. Empirical termination or convergence (the terms are loosely used) has been observed frequently, but there seems to lack a general statement as to why.

AD-641 679 **Field 12A**
Not available from CFSTI.
California Univ., Los Angeles. Dept. of Mathematics.
OPTIMUM DESIGNS FOR POLYNOMIAL EXTRAPOLATION.
Revised ed.,
by Paul G. Hoel. 29 Mar 65, 13p
Grant AF-AFOSR-459-63
Proj. AF-9749
Task 974902
AFOSR-66-0014
Revision of manuscript received 19 Oct 64.
Availability: Published in Annals of Mathematical Statistics v36 n5 p1483-93 Oct 1965.

Descriptors: (*Polynomials, *Mathematical prediction), (*Combinatorial analysis, Polynomials), Optimization, Experimental design.

A solution is given to the problem of where to choose k + 1 points and what weights to assign them in order to obtain the minimum variance of what may be called an interior extrapolated value of a polynomial of degree k. It is assumed that observations can be taken in the interval (-1, 1), except for a subinterval (alpha, beta) located in its interior and within which the extrapolation occurs. This one dimensional solution is then used to solve the corresponding two dimensional problem, for a certain class of polynomials, in which it is desired to extrapolate inside a rectangular region that lies inside a larger rectangular region and within which observations can be taken, exclusive of the interior region. In addition, the two dimensional exterior extrapolation problem is solved for the same class of polynomials as those used for interior extrapolation. (Author)

AD-641 688 **Field 12A**
Not available from CFSTI.
Iowa State Univ., Iowa City.
CONVEXITY WITH RESPECT TO EULER-LAGRANGE DIFFERENTIAL OPERATORS,
by J. Colby Kegley. 24 Jul 64, 28p
Grant AF-AFOSR-438-63
AFOSR-66-1212
Availability: Published in Pacific Journal of Mathematics v 16 n 1 p87-111 1966.

Descriptors: (*Operators (Mathematics), *Convex sets), Functional analysis, Topology, Matrix algebra.

AD-641 690 **Field 12A**
Not available from CFSTI.
Catholic Univ. of America, Washington, D. C. Dept. of Mathematics.
CHARACTERIZATION PROBLEMS FOR DISCRETE DISTRIBUTIONS,
by Eugene Lukacs. 1963, 16p
Grant AF-AFOSR-437-63
Proj. AF-9749
Task 974902
AFOSR-66-1677
Availability: Published in Classical and Contagious Discrete Distributions, Proceedings of the International Symposium, Montreal (Quebec) p65-74 1963.

Descriptors: (*Statistical distributions, *Population (Mathematics)), Stochastic processes, Distribution functions, Theory.

Assumptions concerning the properties of the distributions of certain statistics, based on a sample from a population, will in general impose restrictions on the population distribution function. Characterization problems deal with the question of finding assumptions which determine the population distribution function at least to the extent that it belongs to a certain family of distribution functions. A great variety of assumptions is studied in connection with characterization problems; these problems were surveyed in papers presented at the Third and Fourth Berkeley Symposiums. In this paper only a regression property of certain statistics is considered.

AD-641 702 **Field 12A**
Not available from CFSTI.
Iowa State Univ., Iowa City.
A CLASS OF MONOTONE RICCATI MATRIX DIFFERENTIAL OPERATORS,
by William T. Reid. 3 Aug 64, 11p
Grant AF-AFOSR-438-63
Proj. AF-9749
Task 974902
AFOSR-66-0655
Availability: Published in Duke Mathematical Journal v32 n4 p689-96 Dec 1965.

Descriptors: (*Differential equations, *Matrix algebra), Operators (Mathematics), Theory.

AD-641 704 **Field 12A**
Not available from CFSTI.
New Mexico State Univ., University Park. Dept. of Mathematics.
OPERATOR REPRESENTATION THEOREMS,
by Edward O. Thorp, and Robert J. Whitley. 16 Apr 64, 9p
Grant AF-AFOSR-457-63
Proj. AF-9749
Task 974902
AFOSR-66-1499
Availability: Published in Illinois Journal of Mathematics v9 n4 p595-601 Dec 1965.

Descriptors: (*Theorems, *Operators (Mathematics)), Functional analysis, Topology.

Representation theorems for bounded, compact, and weakly compact operators between Banach space X and Y are given, where Y is B (s), BC (s), or certain other subspaces of B (S). Numerous corollaries and consequences are deduced. In particular more than 100 old and new operator representation theorems (see Dunford-Schwartz, Table, Chapter VI for examples) are readily deduced from a single theorem. (Author)

AD-641 707 **Field 12A, 20K**
Not available from CFSTI.
California Univ., Davis. Dept. of Mathematics.
SOME INEQUALITIES FOR THE FUNDAMENTAL FREQUENCY OF A NONHOMOGENEOUS MEMBRANE.
Revised ed.,
by Dallas O. Banks. 11 Jan 65, 7p
Grant AF-AFOSR-82-64
Proj. AF-9749
Task 974901
AFOSR-66-0022
Revision of manuscript submitted 30 Oct 64.
Availability: Published in J. Soc. Indust. Appl. Math. v13 n3 p635-8 Sep 1965.

Descriptors: (*Inequalities, Boundary value problems), Matrix algebra, Calculus of variations, Vibration, Membranes.

Identifiers: Membrane problem.

This paper gives a method of finding explicit lower bounds for the lowest eigenvalue of a nonhomogeneous membrane with a fixed boundary. The method for obtaining these bounds is an adaptation of the method due to Payne and Weinberger for finding explicit lower bounds for the lowest eigenvalue of a homogeneouse in terms of the fundamental eigenvalues of homogeneous strings.

AD-641 721 **Field 12A, 20D, 20J**
Not available from CFSTI.
Maryland Univ., College Park. Inst. of Fluid Dynamics and Applied Mathematics.
SOME RESULTS IN INTERMEDIATE PROBLEMS FOR EIGENVALUES,
by A. Weinstein. 1964, 20p
Grant AF-AFOSR-400-64
Proj. AF-9749
Task 974901
AFOSR-66-0212
Availability: Published in Intern Symp Appl Annal Math Phys Cagliari-Sassari Italy 28 Sep-4 Oct 1964 -218-34 1965.

Descriptors: (*Calculus of variations, Matrix algebra), Boundary value problems, Elasticity, Field theory, Fluid flow.

Identifiers: Eigenvalues.

The paper presents tables of some numerical results obtained by the method of intermediate problems, some of which can be found in the literature and some of which are published here for the first time.

AD-641 723 **Field 12A**
Not available from CFSTI.
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
COMPLEMENTARY INEQUALITIES IV: INEQUALITIES COMPLEMENTARY TO CAUCHY'S INEQUALITY FOR SUMS OF COMPLEX NUMBERS,
by J. B. Diaz, and F. T. Metcalf. Oct 64, 42p
Grant AF-AFOSR-400-64
Proj. AF-9749
Task 974901
AFOSR-66-1232
Availability: Published in Circolo Matematico di Palermo v13 s2 38p 1964.

Descriptors: (*Inequalities, *Complex numbers), Rings (Mathematics), Theorems, Real numbers.

Several inequalities, complementary to Cauchy's inequalities are proved for complex numbers. These provide lower bounds, and are extensions from complementary inequalities for real numbers. Several ring theorems are proved to establish immediate analogs. (Author)

AD-641 724 **Field 12A**
Not available from CFSTI.
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
A GENERALIZED GOURSAT PROBLEM FOR ELLIPTIC EQUATIONS,
by A. K. Aziz, and R. P. Gilbert. 24 Jul 64, 15p
Grants AF-AFOSR-400-64, NSF-GP-4493
Proj. AF-9749
Task 974901
AFOSR-66-1390
Prepared in cooperation with Naval Ordnance Lab., White Oak, Md.
Journal fur Mathematik v222 13p 1966.

Descriptors: (*Boundary value problems, *Partial differential equations), Functions, Real variables.

The paper is a study of a generalized Goursat problem for elliptic partial differential equations. In the paper use is made of Vekua's approach to show that some of his results can be extended to cover more general boundary value problems. An elliptic equation with linear boundary data given on analytic curves is considered. Existence theorems for the associated hyperbolic problem are obtained and the existence of a unique solution of certain elliptic boundary value problems is established.

AD-641 727 **Field 12A, 9B**
Not available from CFSTI.
New Mexico State Univ., University Park. Dept. of Mathematics.
A PARTIAL ANALYSIS OF GO,
by Edward O. Thorp, and William E. Walden. 1964, 7p
Grants AF-AFOSR-457-63, NSF-G25058
Proj. AF-9749
Task 974902
AFOSR-66-1750
Prepared in cooperation with Los Alamos Scientific Lab., N. Mex.
Availability: Published in Comput J v7 n3 p203-7 1964.

Descriptors: (*Game theory, Analysis), Programming (Computers).

Identifiers: Go (Game).

A game called Computer Go is defined. Computer Go differs from the game of Japanese Go only in that certain imprecisely defined conventions have been replaced by precise rules. Some general theorems on Computer Go are given, as well as a scheme for analysing the game with the aid of a computer. Several reduced versions of Computer Go were analysed, and the resultant strategies are briefly described. (Author)

AD-641 736 **Field 12A**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Mathematics.
LOWER BOUNDS FOR SOLUTIONS OF DIFFERENTIAL INEQUALITIES IN HILBERT SPACE.
Revised ed.,
by Hajimu Ogawa. 2 Oct 64, 6p
Grant AF-AFOSR-553-64
Proj. AF-9749
Task 974902
AFOSR-66-1397
Revision of manuscript submitted 13 Apr 65.
Availability: Published in Proceedings of the American Mathematical Society v16 n6 p1241-3 Dec 1965.

Descriptors: (*Functional analysis, *Inequalities), Differential equations, Theory.

Paper presents simple proofs for obtaining lower bounds for solutions of differential inequalities in Hilbert space.

AD-641 737 **Field 12A, 20J**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Mathematics.
WAVE OPERATORS AND SIMILARITY FOR SOME NON-SELFADJOINT OPERATOR,
by Tosio Kato. 14 Jun 65, 25p
Grant AF-AFOSR-553-64
Proj. AF-9749
Task 974902
AFOSR-66-0675
Availability: Published in Math. Annalen v162 p258-79 1966.

Descriptors: (*Operators (Mathematics), *Perturbation theory), (*Functional analysis, Operators (Mathematics)), Quantum mechanics.

Identifiers: Wave operators.

AD-641 738 **Field 12A**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Mathematics.
ON THE SPECTRUM OF GENERAL SECOND ORDER OPERATORS,
by M. H. Protter, and H. F. Weinberger. 30 Sep 65, 8p
Grant AF-AFOSR-553-64
Proj. AF-9749
Task 974902
AFOSR-66-1216
Prepared in cooperation with Minnesota Univ., Minneapolis.
Availability: Published in Bulletin of the American Mathematical Society v72 n2 p251-5 Mar 1966.

Descriptors: (*Operators (Mathematics), Boundary value problems), Potential theory, Real numbers, Matrix algebra.

Identifiers: Membrane problem.

Paper discusses a technique for locating the spectrum of a nonselfadjoint problem in a half-plane. Such a result is of interest in investigating stability, where one needs to know whether there is any spectrum in a half-plane.

AD-641 741 **Field 12A**
Not available from CFSTI.
Texas Univ., Austin.
AN ELEMENTARY PROOF OF JACKSON'S THEOREM ON MEAN-APPROXIMATION,
by E. W. Cheney. 1965, 6p
Grant AF-AFOSR-467-64
Proj. AF-9749
Task 974901
AFOSR-66-0040
Availability: Published in Mathematics Magazine v38 n4 p189-91 Sep 1965.

Descriptors: (*Theorems, *Approximation (Mathematics)), Polynomials, Measure theory, Functions.

Identifiers: Jackson's theorem.

An elementary proof is given of Jackson's theorem: let P be a Haar subspace of C (a,b). Then each f in C (a, b) possesses at most one best approximation-in-the-mean from P.

AD-641 779 **Field 12A, 20J**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
INEQUALITY WITH APPLICATIONS IN STATISTICAL MECHANICS.
Interim rept.,
by Colin J. Thompson. 18 Mar 65, 5p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1487
Availability: Published in Journal of Mathematical Physics v6 n11 p1812-3 Nov 19 65.

Descriptors: (*Inequalities, *Statistical mechanics), Matrix algebra, Hamiltonian, Functional analysis, Combinatorial analysis.

The author proves for Hermitian matrices (or more generally for completely continuous self-adjoint linear operators in Hilbert space) A and B that Tr (e (A+B)) < Tr (e (A) e (B)). The inequality is shown to be sharper than the convexity property, and its possible use for obtaining upper bounds for the partition function is discussed briefly.

AD-641 800 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Baltimore, Md. Dept. of Statistics.
A BAYESIAN STUDY OF THE MULTINOMIAL DISTRIBUTION.
Technical rept.,
by D. A. Bloch, and G. S. Watson. Oct 66, 40p
TR-59
Contract Nonr-4010 (09)
Proj. NR-042-232

Descriptors: (*Statistical distributions, Analysis), Probability, Distribution theory.

Identifiers: Bayesian analysis.

Lindley (Ann.Math.Stat. 1964) studied the topic in the title. By using Fisher's conditional- Poisson approach to the multinomial and the logarithmic transformation of gamma variables to normality, he showed heuristically that linear contrasts in the logarithms of the cell probabilities theta sub i are asymptotically jointly normal and suggested that the approximation can be improved by applying a 'correction' to the sample. By studying the asymptotic series for the joint distribution, we have verified this assertion and found an improved correction procedure. A more detailed expansion is given for the distribution of a single contrast. In many problems linear functions of the theta sub i are of interest. The exact distribution for these is obtained. This has a density of a form familiar in the theory of serial correlation coefficients. A beta approximation is given. For three cells, a numerical example is given to show the merit of this approximation. The exact joint distribution of two linear functions of the theta sub i is also obtained and the theory is applied to a genetic linkage example. (Author)

AD-641 845 **Field 12A, 6C**
Not available from CFSTI.
Princeton Univ., N. J.
SHORT-CUT MULTIPLE COMPARISONS FOR BALANCED SINGLE AND DOUBLE CLASSIFICATIONS. PART 2. DERIVATIONS AND APPROXIMATIONS,
by T. E. Kurtz, R. F. Link, J. W. Tukey, and D. L. Wallace. 1965, 14p
Supported in part by ONR, NSF, ARO (D), AND PHS. Prepared in cooperation with Chicago Univ., Ill.
Availability: Published in Biometrika v52 n3/4 p485-98 1965.

Descriptors: (*Approximation (Mathematics), Analysis of variance), (*Statistical analysis, Data), Factor analysis, Combinatorial analysis, Biometry.

Part 1 of this paper (AD-620 711) presents tables of approximate percentage points of the ratio of a range to a sum of ranges and discusses their use in multiple-comparison procedures for balanced single and double classifications. The methods of approximation used in the construction of these tables are described here with emphasis on results and methods likely to be of use in other connexions. The basic approximation and the multiple comparison application are described. The distribution whose percentage points are required are set forth. The approximations to mean range are detailed for uncorrelated ranges and correlated ranges. The approximations are assembled to yield the percentage points tabled in Part 1. Representation of all items entering any of the approximations in terms of powers, roots and logarithms are given with bounds on error for each, and an asymptotic approximation is derived. Calculation of the tables of Part 1 is described. (Author)

AD-641 853 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Brandeis Univ., Waltham, Mass. Dept. of Mathematics.
FINAL TECHNICAL REPORT, JULY 1, 1965 TO JUNE 30, 1966.
by William Hammond, Michael Rosen, and Gerald Porter. 15 Jun 66, 24p
Contract Nonr-5152 (00)

Descriptors: (*Groups (Mathematics), Theory), (*Algebra, Groups (Mathematics)), (*Algebraic topology, *Theorems).

Contents: The Modular groups of Hilbert and Siegel, by William F. Hammond; The Jacobson Radical of a Group Algebra, by Michael I. Rosen; and Two Theorems on Galois Cohomology, by Michael Rosen.

AD-641 857 **Field 12A, 13H**
CFSTI Prices: HC$4.00 MF$0.75
Florida State Univ., Tallahassee. Dept. of Statistics.
MULTIVARIATE PAIRED COMPARISONS.
Technical rept.,
by Ralph A. Bradley, and Roger R. Davidson. Sep 66, 112p FSU-Statistics-M121
Contract Nonr-988 (08)
Proj. NR-042-004
ONR-TR-22

Descriptors: (*Multivariate analysis, *Mathematical models), Statistical tests, Quality control.

Identifiers: Paired comparisons.

The study concerns itself with the development of an extension of the Bradley-Terry model for paired comparisons to situations in which responses to paired comparisons are obtained on each of several characteristics. A discussion of several possible approaches to an appropriate model is given and a model is selected. An iterative procedure for obtaining maximum likelihood estimates of the parameters introduced into the model is proposed and its behavior examined in some detail. Test procedures are developed for several tests of interest including a test of the appropriateness of the model. An extensive treatment of the asymptotic properties of the model closely parallels that which has been given for the univariate case by R. A. Bradley (1955). Rank analysis of incomplete block designs. III. Some large-sample results on estimation and power for a method of paired comparisons. (Biometrika 42, 450-470). Two numerical examples are given to illustrate the procedures which have been developed. (Author)

AD-641 860 **Field 12A**
Not available from CFSTI.
California Univ., Riverside.
U (EPSILON)-SETS FOR WALSH SERIES,
by Victor L. Shapiro. 18 Jul 64, 6p
Grant AF-AFOSR-696-64
Proj. AF-9749
Task 974902
AFOSR-66-1195
Availability: Published in Proceedings of the American Mathematical Society v16 n5 p867-70 Oct 1965.

Descriptors: (*Set theory, *Series), Functions, Pseudo-random systems, Measure theory.

Identifiers: Walsh series.

AD-641 862 **Field 12A**
Not available from CFSTI.
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
LIAPUNOV CRITERIA FOR WEAK STOCHASTIC STABILITY,
by W. M. Wonham. 1966, 15p
Grant AF-AFOSR-693-64
Proj. AF-9749
Task 974901
AFOSR-66-1194
Availability: Published in Journal of Differential Equations v2 n2 p195-207 Apr 1966.

Descriptors: (*Stochastic processes, *Stability), (*Differential equations, Stability), Diffusion, Boundary value problems, Invariance.

Identifiers: Lyapunov functions.

Sufficient conditions for recurrence and positivity are established for the diffusion process defined by a stochastic differential equation of Ito's type. In addition, conditions for non-recurrence and non-positivity are obtained. A non-linear system of the Lur'e type is discussed. (Author)

AD-641 864 **Field 12A**
Not available from CFSTI.
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
A NOTE ON THE MAXIMUM SAMPLE EXCURSIONS OF STOCHASTIC APPROXIMATION PROCESSES.
Revised ed.,
by Harold J. Kushner. 27 Aug 65, 6p
Grants AF-AFOSR-693-64
Proj. AF-9749
Task 974901
AFOSR-66-1240
Revision of manuscript submitted 8 Mar 65.
Availability: Published in Annals of Mathematical Statistics v37 n2 p513-6 Apr 1966.

Descriptors: (*Stochastic processes, Monte Carlo method), Approximation (Mathematics).

A result is obtained on the maximum sample excursions of the Kiefer-Wolfowitz stochastic approximation process. The method of obtaining estimates is applicable to other stochastic approximation procedures and a wide range of conditions. (Author)

AD-641 870 **Field 12A**
Not available from CFSTI.
Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
A REMARK ON MORSE THEORY,
by J. T. Schwartz. Jun 65, 8p
Grant AF-AFOSR-684-64
Proj. AF-9749
Task 974902
AFOSR-66-1537
Availability: Published in Communications on Pure and Applied Mathematics v19 n2 p139-43 May 1966.

Descriptors: (*Groups (Mathematics), Algebraic topology), Rings (Mathematics), Functional analysis.

Identifiers: Morse theory.

AD-641 881 **Field 12A, 20K**
Not available from CFSTI.
Alberta Univ., Calgary. Dept. of Mathematics.
VECTOR LYAPUNOV FUNCTIONS AND CONDITIONAL STABILITY,
by V. Lakshmikantham. 1965, 13p
Grant AF-AFOSR-670-64
Proj. AF-9749
Task 974901
AFOSR-66-1209
Availability: Published in Journal of Mathematical Analysis and Application v10 n2 p368-77 Apr 1965.

Descriptors: (*Vector analysis, *Stability), (*Functional analysis, Stability), Nonlinear differential equations, Inequalities, Canada.

Identifiers: Lyapunov functions.

Sufficient conditions for conditional stability and boundedness of solutions to non-linear differential equations are obtained in terms of vector Lyapunov functions. Ordinary differential equations, differential equations with unbounded operators in Banach spaces, functional differential equations, and parabolic differential equations are classes for which this theory is applicable. (Author)

AD-641 883 **Field 12A**
Not available from CFSTI.
Minnesota Univ., Minneapolis.
FINITE SETS ON CURVES AND SURFACES,
by H. Guggenheimer. 1965, 13p
Grant AF-AFOSR-661-64
Proj. AF-9749
Task 974902
AFOSR-66-1214
Availability: Published in Israel Journal of Mathematics v3 n2 p104-12 Jun 1965.

Descriptors: (*Differential geometry, Theory), Set theory, Topology.

Identifiers: Jordan curves.

A complete proof is given for Schnirelmann's theorem on the existence of a square in C2 Jordan curves. The following theorems are then proved, using the same method: 1. On every hypersurface in Rn, C3-diffeomorphic to Sn-1, there exist 2n points which are the vertices of a regular 2n-cell Cn. 2. Every plane C' Jordan Curve can be C' approximated by a curve on which there are 2N distinct points which are the vertices of a centrally symmetric 2N-gon (angles pi not excluded). 3. On every plane C2 curve there exist 5 distinct points which are the vertices of an axially symmetric pentagon with given base angles a, pi/2 < or = a < pi. (The angle at the vertex on the axis of symmetry might be pi). (Author)

AD-641 884 **Field 12A**
Not available from CFSTI.
Minnesota Univ., Minneapolis. Dept. of Mathematics.
PSEUDO-MINKOWSKI DIFFERENTIAL GEOMETRY,
by Heinrich W. Guggenheimer. 1965, 71p
Grant AF-AFOSR-661-64
Proj. AF-9749
Task 974902
AFOSR-66-1215
Availability: Published in Annali di Matematica Pura ed Applicata v70 s4 p305-70 1965.

Descriptors: (*Differential geometry, Theory), Measure theory, Functional analysis.

Identifiers: Pseudo-Minkowski geometry.

The method of moving frames is applied to finite dimensional Banach spaces with smooth but unsymmetric unit spheres. The results obtained present a far reacing generalization of euclidean methods. A complete theory of curvature is given. The theorems associated with the four-vertex-theorem are reduced to a general theorem on differential equations with periodic orbit. Integral geometry is shown to depend on the group of the Hadwiger-Glur theorem only, not on the rotation group. The power of this approach is demonstrated in many detailed formulas. The theory of space curves and surfaces is developed along similar lines. Here significant departures from the euclidean case do appear. Surface area is defined as a function in Grassmann-space, not as a set function. The foundations of Finsler geometry are given. (Author)

AD-641 934 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
THE CONSTRUCTION OF SATURATED DESIGNS.
Technical rept.,
by Norman R. Draper, and Toby J. Mitchell. Jul 66, 36p TR-80
Contract Nonr-1202 (17)
Proj. NR-042-222

Descriptors: (*Experimental design, *Combinatorial analysis), Optimization, Sequential analysis.

Identifiers: Saturated designs.

If a 2k-p design, of fixed resolution R and specified number of runs 2q, accommodates the maximum possible number of variables, the authors say that it is saturated. In this paper, they develop a method for constructing saturated designs and apply it to an example.

N66-33401 **Field 12A**
CFSTI Prices HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. Of Statistics.
UNLIMITED SIMULTANEOUS DISCRIMINATION INTERVALS IN REGRESSION TECHNICAL REPORT NO. 90.
by M. A. Hamilton, G. J. Lieberman, and R. G. Miller Jr. 29 Jul 66, 29p NASA-CR-77022
Contract NONR-225/53/
Sponsored In Part By Nasa

Descriptors: *Discrimination, *Mathematical statistics, *Regression analysis, Analysis, Interval, Linear, Mathematics, Numerical, Regression, Simultaneous, Statistics, Variable.

For abstract, see STAR 04 19.

N66-33402 **Field 12A**
CFSTI Prices HC$2.00 MF$0.50
Kent State Univ., Ohio. Dept. Of Mathematics.
ON DIRECTED GRAPHS AND RELATED TOPOLOGICAL SPACES TECHNICAL REPORT NO. 2.
by T. J. Ahlborn. 30 Sep 64, 44p NASA-CR-77019
Grant NSG-568

Descriptors: *Set theory, *Topology, *Vector space, Additive, Closure, Connection, Core, Graph, Kernel, Mapping, Operator, Point, Property, Set, Space, Theory, Vector.

For abstract, see STAR 04 19.

N66-33438 **Field 12A**
CFSTI Prices HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Center For Dynamical Systems.
ASYMPTOTIC STABILITY OF SAMPLED NONLINEAR SYSTEMS WITH VARIABLE SAMPLING PERIODS -- A BIONIC APPLICATION DISCUSSION.
by J. J. Hurt, and J. P. La salle. 1966, 8p NASA-CR-77045
Contract NGR-40-002-015

Descriptors: *Liapunov function, *Nonlinear system, *Sampled data system, Algebra, Asymptote, Bionics, Corollary, Criterion, Data, Linear, Nonlinear, Sample, Stability, System, Theorem.

For abstract, see STAR 04 19.

N66-33462 **Field 12A**
CFSTI Prices HC$2.00 MF$0.50
Pennsylvania State Univ., University Park.
ROOT LOCUS DIAGRAMS BY DIGITAL COMPUTER.
by R. Fornaro, and A. M. Krall. Aug 66, 36p NASA-CR-555
Contract NGR-39-009-041

Descriptors: *Computer program, *Differential equation, *Digital computer, Coefficient, Computer, Constant, Differential, Digital, Equation, Ibm 7074 computer, Linear, Locus, Mathematics, Program, Root, Stability, System.

For abstract, see STAR 04 19.

N66-33537 **Field 12A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
EXPLICIT RUNGE- KUTTA INTEGRATION.
by L. R. Dickey. 28 Jul 66, 13p NASA-TM-X-53495

Descriptors: *Differential equation, *Linear equation, *Runge-kutta integration, Differential, Equation, Fourth, Function, Integration, Linear, Method, Order, Solution, Step, System, Time.

For abstract, see STAR 04 19.

N66-33573 **Field 12A**
CFSTI Prices HC$2.00 MF$0.50
Bellcomm, Inc., Washington, D. C.
AN APPLICATION OF GROUP THEORY TO THE NUMERICAL INTEGRATION OF THE EQUATIONS OF MOTION OF A CONSERVATIVE DYNAMICAL SYSTEM.
by H. A. Helm. 1 Sep 65, 31p NASA-CR-76940, TM-65-1032-3
Contract NASW-417

Descriptors: *Group theory, *Motion equation, *Numerical integration, Conservation, Dynamic, Equation, Group, Hamiltonian, Integration, Mapping, Motion, Numerical, System, Theory, Transformation.

For abstract, see STAR 04 19.

N66-33680 **Field 12A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
ONE NON-LINEAR PROBLEM WITH A FREE BOUNDARY.
Ob Odnoy Nelineynoy Zadache So Svobodnoy Granitsey
by I. I. Danilyuk. Jun 66, 13p NASA-TT-F-10221
Transl. Into English From Dokl. Akad. Nauk Sssr (Moscow), V. 162, No. 5, 1965 P 979-982

Descriptors: *Free boundary, *Harmonic function, *Nonlinear equation, *Periodic function, Application, Boundary, Equation, Flow, Free, Function, Harmonic, Heavy, Hydrodynamics, Jet, Liquid, Nonlinear, Periodic, Problem, Surface, Wave.

For abstract, see STAR 04 19.

N66-34075 **Field 12A**
CFSTI Prices HC$2.00 MF$0.50
Kent State Univ., Ohio. Dept. Of Mathematics.
ON DIAMETERS OF GRAPHS AND DIGRAPHS.
by L. J. Okorn. Aug 66, 38p NASA-CR-77084
Grant NSG-568
Its Tech. Rept.-13

Descriptors: *Algebra, *Graph, Diameter, Edge, Elongation, Incidence, Length, Matrix, Network, Structure, Tree, Vertex.

For abstract, see STAR 04 19.

N66-37778 **Field 12A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NEW ONE-STEP INTEGRATION METHODS OF HIGH-ORDER ACCURACY APPLIED TO SOME PROBLEMS IN CELESTIAL MECHANICS.
by E. Fehlberg. Oct 66, 49p NASA-TR-R-248

Descriptors: *Celestial mechanics, *Differential equation, *Initial value problem, *Numerical integration, Expansion, Formula, Method, One, Ordinary, Power series, Runge-kutta method, Step.

For abstract, see STAR 04 23.

N66-37927 **Field 12A**
CFSTI Prices HC$1.00 MF$0.50
Rutgers Univ., New Brunswick, N. J. Statistics Center.
CHAIN SAMPLING INSPECTION PLANS - CHSP-0,4 AND CHSP-1, 4 TECHNICAL REPORT NO. N-24.
by H. F. Dodge, and K. S. Stephens. Feb 66, 21p NASA CR-78451
Contract NONR-404/18/
Sponsored In Part By Nasa

Descriptors: *Markov chain, *Sampling, *Stochastic process, *Transition probability, Chain, Characteristics, Inspection, Operation, Plan, Property, Statistical.

For abstract, see STAR 04 23.

N66-38504 **Field 12A**
CFSTI Prices HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
ALGORITHMIC COMPLEXITY.
by R. Stanley. 1 Sep 66, 17p NASA-CR-78553, JPL-TR-32-999
Contract NAS7-100

Descriptors: *Algorithm, *Discrete function, *Quantitative analysis, Automaton, Boolean algebra, Complexity, Computer, Linear, Mapping, Matrix, Measurement, Multiplication, Permutation, Theorem, Variable.

For abstract, see STAR 04 23.

N66-38731 **Field 12A**
CFSTI Prices HC$5.00 MF$1.25
Northeastern Univ., Boston, Mass.
ON LINEAR PRODUCT CODES AND THEIR DUALS SCIENTIFIC REPORT NO. 4.
by L.-J. Weng. Jun 66, 188p NASA-CR-78538, AFCRL-66-471
Contracts NGR-22-011-013, AF 19/628/-3312

Descriptors: *Coding, *Dual control problem, *Tensor field, Algebra, Bose-chaudhuri code, Check, Code, Component, Decoding, Encoding, Generator, Linear, Matrix, Parity, Permutation, Space, Tensor, Theory.

For abstract, see STAR 04 23.

PB-173 442 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
FACTOR CHANGES AND LINEAR TRENDS IN EIGHT-RUN TWO-LEVEL FACTORIAL DESIGNS.
Technical rept.,
by Norman R. Draper, and David M. Stoneman. Aug 66, 17p TR-82
Grant NSF-GP-5459

Descriptors: (*Combinatorial analysis, *Experimental design), Factor analysis.

Eight-run two level factorial and fractional factorial designs are examined from two points of view: (1) the number of levels which must be changed in performing the design, (2) the effect of a first order time trend on the main effects. It is found that only a few run orders are desirable from these viewpoints and thus randomization of the runs is likely, in general, to lead to an unfavorable sequence. (Author)

AD-101 287 **See Field 17I**

AD-101 882 **See Field 17I**

AD-641 339 **See Field 5A**

AD-641 417 **See Field 5J**

AD-641 486 **See Field 7D**

AD-641 541 **See Field 9B**

AD-641 655 **See Field 19D**

AD-641 680 **See Field 20J**

AD-641 810 **See Field 9B**

AD-641 986 **See Field 14B**

AD-80 638 **See Field 17I**

AD-85 423 **See Field 17G**

AD-85 982 **See Field 17G**

PB-173 410 **See Field 13B**

12B. OPERATIONS RESEARCH

AD-641 357 **Field 12B, 5A**
CFSTI Prices: HC$5.00 MF$1.00
RAND Corp., Santa Monica, Calif.
SELECTION DISCIPLINES IN A SINGLE-SERVER QUEUEING SYSTEM,
by Louis W. Miller. Oct 66, 152p RM-4693-PR
Contract AF 49 (638)-1700

Descriptors: (*Queueing theory, Selection), Scheduling, Operations research, Management planning.

The report presents a unified analysis and comparison of job selection rules applied to the M/G/1 queueing system. Laplace-Stieltjes transforms and means of the steady-state distributions of waiting time are obtained. Selection disciplines may be based on relative arrival times (processing time independent rules), job classes (priority rules), and processing time requirements. Priority disciplines may include a preemptive feature allowing a new arrival to interrupt the processing of another job. Performance, as measured by average time in system, can be improved by using a rule that favors shorter jobs. Even relatively crude rules with this characteristic can bring significant improvement. The shortest remaining processing time discipline is optimal when preemption without loss is possible. When changeovers between job classes are accompanied by setup delays, the alternating priorities rule has the highest capacity. An elementary knowledge of probability theory is assumed and introductory material on the Poisson distribution and the Laplace-Stieltjes transform is included. (Author)

AD-641 493 **Field 12B**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Electrical Engineering.
OPTIMAL CONTROL OF APERIODIC DISCRETE-TIME SYSTEMS.
Revised ed.,
by B. W. Jordan, and E. Polak. 9 Nov 64, 18p
Grants AF-AFOSR-139-63, NsG-354
Proj. AF4751
AFOSR-66-0044
Prepared in cooperation with Aerospace Corp., Los Angeles, Calif. Revision of manuscript submitted 19 Mar 64.
Availability: Published in J. Siam Control (SerA) v2 n3 p332-46 1965.

Descriptors: (*Optimization, *Control), Nonlinear differential equations, Vector analysis, Hamiltonian, Time, Control systems.

Much of previous work on the optimal control of discrete-time processes was concerned with sampled-data systems in which the sampling instants are fixed and equi-spaced and in which the optimization is carried out over the amplitudes of the piecewise constant controls. This paper is devoted to establishing necessary conditions for optimal control of a class of fixed duration, discrete-time processes with aperiodically modulated inputs, which are suggested by engineering considerations. The plants of the systems under consideration are described by nonlinear differential equations and the inputs are piecewise constant, suitably restricted in amplitude, and required to have K or fewer discontinuities whose position is not restricted. (K is a fixed, positive integer.) Using techniques analogous to the ones used in establishing the Pontryagin maximum principle, it is shown that for an admissible control to be optimal, it is necessary that a Hamiltonian-like functional be either locally maximum or stationary with respect to the admissible controls, and that a set of transversality conditions be satisfied. Computational and engineering aspects of this problem are dealt with in a separate paper to be published soon.

AD-641 499 **Field 12B, 5A**
CFSTI Prices: HC$5.00 MF$1.00
Cornell Univ., Ithaca, N. Y. Dept. of Industrial Engineering and Operations Research.
OPTIMAL POLICIES FOR TWO PRODUCT INVENTORY SYSTEMS, WITH AND WITHOUT SETUP COSTS.
Technical rept.,
by Edward J. Ignall. Aug 66, 177p TR-13
Contract Nonr-401 (55)
Proj. NR-047-055

Descriptors: (*Optimization, *Inventory control), Costs, Dynamic programming, Operations research.

For the case of no setup cost, the structure of the transient portion of the optimal N period policy for two product inventory systems is obtained, the recurrent portion having been obtained by Veinott. The function L, the expected holding and shortage cost this period, is assumed to satisfy conditions roughly equivalent to (a) having a unique minimum and (b) being quasiconvex in each dimension with the relative minimum decreasing as the other value increases. The policy is: do not order the overstocked product and order less of the other product than would be ordered if there were no overstocked product. The policy is stationary, depending neither on N nor on the number of periods remaining. For the setup cost case, the optimal N period policy is obtained under strong assumptions on L and the optimal one period policy under (a) and (b). Bounds analogous to those of Veinott and Wagner are obtained. The apparent inappropriateness of K-convexity is discussed. (Author)

AD-641 620 **Field 12B**
Not available from CFSTI.
State Univ. of New York, Stony Brook. Dept. of Electrical Sciences.
GENERAL THEORY OF OPTIMAL PROCESSES,
by Sheldon S. L. Chang. 29 Jun 65, 13p
Grant AF-AFOSR-542-64
Proj. AF-9749
Task 974901
AFOSR-66-1217
Prepared for presentation at International Conference on Programming and Control (1st) held at United States Air Force Academy, Colorado, April 15, 1965.
Availability: Published in J SIAM Control v4 n1 p46-55 1966.

Descriptors: (*Optimization, Theory), Calculus of variations, Control.

In the present paper a general version of the maximum principle is formulated and proved. Pontryagin's maximum principle and various extensions thereof become special cases which can be readily derived from the general version. Of special interest are the following generalizations: (1) discrete systems, (2) systems with multiple merit criteria, (3) restriction of the control function u to a special class of functions, and (4) systems with bounded state variables. (Author)

AD-641 685 **Field 12B**
Not available from CFSTI.
California Univ., Berkeley. Electronics Research Lab.
A NOTE ON AIZERMAN'S CONJECTURE,
by A. G. Dewey, and E. I. Jury. 24 May 65, 3p
Grant AF-AFOSR-292-64
Proj. AF-9749
Task 974901
AFOSR-66-0657
Availability: Published in IEEE Transactions on Automatic Control vAC10 n4 p482-3 Oct 1965.

Descriptors: (*Control, *Dynamics), Stability, Differential geometry, Numerical analysis.

Identifiers: Aizerman's conjecture.

In 1949, Aizerman made the conjecture that a regulator system with a single nonlinear element will be asymptotically stable in the large for all nonlinearities contained in the Hurwitz sector. This note presents a numerical counter-example to Aizerman's conjecture. Such an example for continuous systems has not previously appeared in the literature even though the work of Pliss has been known for many years. Since Aizerman's conjecture is not ture in general, the approach to the problem of absolute stability must be that of Bergen and Williams, that is, to single out those classes of systems for which the conjecture can be verified.

AD-641 689 **Field 12B**
Not available from CFSTI.
California Univ., Berkeley. Electronics Research Lab.
A STABILITY INEQUALITY FOR A CLASS OF NONLINEAR FEEDBACK SYSTEMS.
Revised ed.,
by A. G. Dewey, and E. I. Jury. 13 Oct 65, 12p
Grant AF-AFOSR-292-64
Proj. AF-9749
Task 974901
AFOSR-66-1373
Revision of manuscript submitted 23 Apr 65.
Availability: Published in IEEE Transactions on Automatic Control vAC11 n1 p54-62 Jan 1966.

Descriptors: (*Control, Stability), (*Inequalities, Stability), Feedback, Nonlinear systems, Control systems, Dynamics.

Identifiers: Aizerman's conjecture.

For some systems, the Popov stability criterion fails to verify Aizerman's conjecture, that is, when Popov sector is not equal to the linear (Hurwitz) sector. In these cases, the question of stability for a nonlinearity which exceeds the Popov sector, but which is included in the Hurwitz sector, but which is included in the Hurwitz sector, is unanswered. This paper provides a partial answer to this question by taking into account the slope of the nonlinear function. Two examples are given, in the first of which the sector is extended up to the linear limit. The Popov theorem concerned only the zero-input response of the nonlinear feedback system, whereas here a restricted class of inputs to the system is allowed.

AD-641 792 **Field 12B, 9C**
Not available from CFSTI.
Stevens Inst. of Tech., Hoboken, N. J. Dept. of Electrical Engineering.
IDENTIFICATION OF LINEAR SYSTEM DYNAMICS USING EXPONENTIAL SPECTRAL COEFFICIENTS,
by G. W. Smith, and P. R. Clement. 1966, 16p
Grant AF-AFOSR-601-64
Proj. AF-9749
Task 974901
AFOSR-66-0882
Availability: Published in Journal of the Franklin Institute v281 n2 p122-35 Feb 1966.

Descriptors: (*Dynamics, Identification), Linear systems, Exponential functions, Mathematical models, Fourier analysis, Series, Matrix algebra, Differential equations.

Identifiers: Time-varying systems, Spectral analysis.

A vector space with a basis of real exponential time functions is used as the intermediary in identifying linear differential-equation models of unknown systems in the presence of noise. Linear constant-parameter and time-varying-parameter systems are considered in particular. A systematic procedure for the determination of the structure and the values of the parameters of the model is given for the situation where the noise is negligible. Parameter estimations in the presence of noise is given in terms of confidence regions in result space. Digital computer results are given for parameter determination of frozen system models for second-order time-varying systems. (Author)

AD-641 869 **Field 12B**
Not available from CFSTI.
Brown Univ., Providence, R. I.
LOCAL DEFINITION OF GENERALIZED CONTROL SYSTEMS,
by Emilio Roxin. 26 Aug 65, 9p
Grants AF-AFOSR-693-64, NGR-40-002-015
Proj. AF-9749
Task 974901
AFOSR-66-0760
Prepared in cooperation with Buenos Aires Univ., (Argentina).
Availability: Published in Michigan Mathematical Journal v13 p91-6 1966.

Descriptors: (*Control systems, Theory), Stability, Topology.

This paper provides axioms that define general control systems locally, on a closed subset of the phase space. This provides a basis for dealing with aspects of stability theory which require local definition, say in some neighborhood of a rest point. (Author)

AD-641 935 **Field 12B**
CFSTI Prices: HC$2.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Statistics.
DISCRETE MODELS FOR FORECASTING AND CONTROL.
Technical rept.,
by G. E. P. Box, and G. M. Jenkins. Jun 66, 27p
TR-76
Grant AF-AFOSR-1158-66
Prepared in cooperation with Lancaster Univ. (England). Dept. of Systems Engineers.

Descriptors: (*Mathematical models, Mathematical prediction), Control, Operations research.

The authors first describe a class of discrete linear time series models capable of representing nonstationary as well as stationary behavior. In control problems these models are used to describe disturbances to the system. Dynamic models which represent relationships between variables which control and are controlled are later introduced. The identification, fitting, checking and practical use of such models in forecasting and control are discussed. The models employed are empirico-mechanistic in that while they can be interpreted as descriptions of physical phenomena having the right general character they do not claim to represent exact physical reality and are fitted to data empirically. An important principle in the choice of such models is that, they should, while adequately representing the data, contain the fewest possible number of parameters. This is called the principle of parsimony or of parsimonious parametrization. (Author)

AD-101 000 **See Field 17G**

AD-227 738 **See Field 15G**

AD-641 628 **See Field 12A**

AD-641 865 **See Field 22C**

13A. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

AD-488 439 **Field 13A**
CFSTI Prices: HC$2.00 MF$0.50
Air Preheater Co., Inc., Wellsville, N. Y.
INVESTIGATE ADVANCED HEAT EXCHANGER DESIGNS OF COMPACT HEAT EXCHANGERS WHEN OPERATIVE IN A MARINE ENVIRONMENT.
Quarterly progress rept. no. 1, 24 Jun-25 Sep 65. 8 Oct 65, 33p
Contract NObs-92559
Proj. SF013-06-14, 1016-517
Task 3890

Descriptors: (*Heat exchangers, Design), Wind tunnels, Turbulence, Scheduling, Heat transfer, Fluid flow, Velocity, Porous materials, Cooling, Metal plates, Mathematical models.

The overall objective of this contract is to obtain a fundamental understanding of the performance of perforated plates as a heat transfer surface for compact heat exchangers. In line with this, a low turbulence wind tunnel is to be used throughout the test program.

PB-173 403 **Field 13A**
CFSTI Prices: HC$1.00 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
STABILISATEURS DE TENSION POUR FOURS A HAUTE TEMPERATURE (Voltage Stabilizators for High Temperature Furnace),
by Jacques Huet. Oct 66, 14p CEA-R-3050
Text in French; attached summary in English.

Descriptors: (*Furnaces, *Temperature control), (*Voltage regulators, Furnaces), Control systems, Circuits, Servomotors, France.

The stabilization of furnace temperatures in the range 1500-2500C has been achieved by controlling the effective (rms) value of the supply voltage of the heating element. Temperature variations are less than, or equal to, one degree C in the whole working range of the furnace. Two types of set-ups have been developed: one is static, the other makes use of a servomotor. (Author)

AD-641 399 **See Field 17B**

AD-641 701 **See Field 13M**

AD-641 842 **See Field 20D**

AD-641 856 **See Field 20D**

AD-641 927 **See Field 14B**

13B. CIVIL ENGINEERING

AD-641 844 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Operations Research Center, Univ. of Calif., Berkeley.
TRAFFIC SIGNAL SYNCHRONIZATION ON A ONE-WAY STREET.
Research rept.,
by E. Bavarez, and G. F. Newell. Aug 66, 29p
ORC-66-20
Contract Nonr-222 (83)
Projs. NR-047-033, RR-033-07-01

Descriptors: (*Traffic, *Signal lights), Scheduling, Time, Roads.

Identifiers: Traffic signals.

Consideration is given to a one-way street which intersects on one-way (side) streets. Traffic approaching the first street is steady as are the flows on all side streets. Traffic signals are idealized as perfect on-off switches and traffic is treated as a fluid moving with a constant velocity on the main street. Total delay and total number of stops are evaluated for several types of signal coordination schemes. Some conclusions are: (1) For any given common cycle time and given splits at each intersection, there is a choice of off-sets (phases) which simultaneously minimizes both the total delay and stops but it is not necessarily the one which produces a 'through band'. (2) There are signal settings for which some signals operate on half or a third the cycle time of other lights, that give a main street delay equal to that for the optimal common cycle time setting but give less delay to the side street. (3) Similar models are commonly used to find maximum through bands for two-way traffic, but it is not obvious that this is a suitable objective even for one-way streets. (Author)

AD-641 925 **Field 13B, 5C, 5I**
CFSTI Prices: HC$9.65 MF$2.75
Princeton Univ., N. J. Bureau of Urban Research.
THE IMPACT OF LARGE INSTALLATIONS ON NEARBY AREAS,
by Gerald Breese, Russell J. Klingenmeier, Jr., Harold P. Cahill, Jr., James E. Whelan, and Archer E. Church, Jr. Aug 65, 639p
Contract NBy-32250
NCEL-CR-67.001

Descriptors: (*Military facilities, Urban planning), (*Industries, Urban planning), Population, Economics, Site selection, Rural areas, Housing, Employment, Sociology, Georgia, New York, Pennsylvania, Delaware, South Carolina.

The establishment of a large industrial or military installation involves enormous changes in the nearby area's land use, population, government, and economy, as revealed by the five case studies in the report. The case studies illustrate different sizes and types of use (integrated steel mill, Atomic Energy Commission plant, Naval training camp, Air Force base, and aircraft manufacturing plant), geographic areas, focal study areas, and varying kinds of sponsorship. In virtually every case, the new installation's effect on the host area involved a change from a predominantly rural or semi-urban type of living and development to an urban type. Common problems included: financial burden on local areas for provision of expanded facilities; lag in provision of commercial facilities and private housing; relocation of displaced persons and businesses; disruption in the local society and economy due to exceptional demands; inflation in land values; and ineffective development controls, particularly evident in the case of urban planning and subdivision regulations. The characteristics of impact patterns and the devices for anticipating related events and issues are identified. (Author)

N66-38347 **Field 13B**
CFSTI Prices HC$1.00 MF$0.50
Chemical Lab. Rvo-tno, Rijswijk (Netherlands).
VAPOUR CONCENTRATIONS AND DOSES DOWNWIND FROM A TERRAIN, CONTAMINATED WITH A PERSISTENT AGENT.
by L. A. Clarenburg. May 66, 22p TDCK-45744
Its Rept.-1966-7

Descriptors: *Air pollution, *Contamination, *Mathematics, *Terrain, *Wind circulation, Agent, Atmospheric, Chemical, Concentration, Diffusion, Diurnal, Dose, Down, Duration, Theory, Vapor, Variation.

For abstract, see STAR 04 23.

PB-173 362 **Field 13B, 13C**
CFSTI Prices: HC$2.60 MF$0.50
Maine State Highway Commission. Testing and Planning Div.
MAINE TEST FOR DELETERIOUS MATERIAL IN AGGREGATES.
Final rept.,
by A. C. Lyon. Jun 66, 26p Rept. no. 0571
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, Test methods), (*Pavements, Test methods), Impurities, Degradation, Rock (Geology), Roads, Maine.

Identifiers: Aggregates (Materials).

The purpose of the study was to improve the 'Maine test for deleterious materials' in concrete aggregates. A modification of Maine's former test was developed which correlated well with service records, and freezing and thawing tests, and which gave good reproducibility. (BPR abstract)

PB-173 404 **Field 13B**
CFSTI Prices: HC$5.00 MF$1.00
Mississippi Univ., University. Engineering Experiment Station.
A STUDY OF AN EXPERIMENTAL CONTINUOUSLY. REINFORCED CONCRETE PAVEMENT, INTERSTATE NO. 59, JONES COUNTY, MISSISSIPPI.
Final rept.,
by George O. Manifold, and Samuel Y. W. Ng.
15 Jul 66, 164p
Proj. 1-59-2 (15)79

Descriptors: (*Mississippi, Civil engineering), (*Roads, Reinforced concrete), Pavements, Experimental data, Reinforcing materials, Joints, Strain (Mechanics), Defects (Materials), Deformation, Force (Mechanics).

Identifiers: Highway engineering.

Two experimental continuously reinforced concrete pavements were constructed in Mississippi to obtain first-hand knowledge on performance under local conditions. The final report on the initially constructed pavement, known as the DeSoto County Project, was published in April, 1965. This report deals with the second pavement, or the Jones County Project. The Jones County Project, built in the winter and early spring of 1962, consists of 6.77 miles of 4-lane divided highway. The pavement of the northbound roadway is reinforced with smooth welded wire fabric and the pavement of the southbound roadway contains deformed steel bars. All of the experimental pavement is 8 inches thick and the reinforcing steel is at mid-depth of the slab. One mile of 9-inch conventionally reinforced pavement adjacent to the north end of the experimental pavement is included in the study, for purposes of comparison. Major experimental features are (1) type of reinforcement--smooth welded wire fabric and deformed bars, (2) percentage of longitudinal steel--0.5, 0.6 and 0.7 for each type of reinforcement and (3) cast-in-place, full-width concrete anchor lugs to restrain longitudinal movement of the ends of the continuously reinforced pavement. (Author)

PB-173 410 **Field 13B, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Virginia Council of Highway Investigation and Research, Charlottesville.
THE IMPLICATIONS OF SEVERAL TYPES OF STATISTICAL SPECIFICATIONS,
by J. H. Dillard. Jul 66, 41p SR66-11

Descriptors: (*Virginia, Research program administration), (*Roads, Statistical analysis), Engineering personnel, Statistical processes, Statistical data, Sequential analysis, Sampling, Quality control, Specifications, Measure theory, Analysis of variance.

Identifiers: Highway engineering.

The development of statistical procedures for determining conformance transcends a knowledge of statistics and involves questions related to administrative, personnel and legal problems of the broadest sort. At this early stage in the consideration of using statistical tools in highway construction, there seems to be a natural tendency to become enchanted with the theory of the various statistical programs applied to industry. Some methods that have been proposed for highways do not appear feasible after an examination of how they would be applied. The many factors that must be considered indicate that ideal specifications cannot be prepared solely from the viewpoint of the enforcing agency. This report attempts to point out implications of several types of statistical specifications in a practical way, many are obvious but some are very subtle, yet important. The adoption of statistical specifications will involve administrative and policy decisions of the broadest sort.

PB-173 417 **Field 13B**
CFSTI Prices: HC$3.00 MF$0.75
Texas Transportation Inst., Texas A and M Univ., College Station.
CHANNELIZATION.
Final research rept.,
by Neilon J. Rowan, and Thomas G. Williams.
Mar 66, 63p RR 19-4, 0525
Proj. 2-8-60-19

Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Texas, Civil engineering), (*Traffic, Guidance), Roads, Vehicles, Safety, Approach, Pavement, Visibility, Reflectors, Slurry coating.

Identifiers: Traffic engineering.

The study gives primary consideration to the approach-end treatment of channelization, with particular emphasis placed on driver's visibility under condition of night driving in adverse weather. Studies were conducted to determine the relative visibility and serviceability of marking materials for delineating channelization islands. Raised markings constructed with a slurry mixture were the most satisfactory of the devices tested. They provided stripes of sufficient height to cause an adequate vehicle rumble and presented a convenient surface texture for visibility purposes. Other studies were performed to evaluate the relative visibility and legibility of signs used to direct traffic around the approach-ends of channelizing islands. Eight different signs were used. They were similar in geometric configuration but differed in the types of materials used and the methods of illumination. The most satisfactory signs tested had prismatic reflectors or reflective sheeting on a black background. (Author)

PB-173 421 **Field 13B, 13C, 13M**
CFSTI Prices: HC$2.00 MF$0.50
Louisiana Dept. of Highways.
NUCLEAR MOISTURE-DENSITY EVALUATION. PART II.
Final rept.,
by John E. Scotto, Jr., and Charles M. Higgins.
Jun 66, 27p Rept. no. 0511, RR-22
Proj. 62-1SB
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Construction), (*Soil mechanics, Road building equipment), Soils, Density, Moisture, Nuclear industrial applications, Foundations (Structures), Civil engineering.

The portable nuclear moisture-density devices evaluated in this study were found to be accurate tools for the determination of in-place density. They were also found to be sufficiently rugged for field use with little more than normal care. From extensive field testing it was found that some revisions needed to be made in the testing procedure and calibration of the nuclear devices as reported in Louisiana Department of Highways Research Report No. 13, published in November, 1964. These changes were considered to be essential for efficient use of the nuclear devices. A new test method has been prepared for the use of this equipment as an aid to compaction control (LDH TR 401-65) and is included in the appendix.

PB-173 487 **Field 13B, 13C**
CFSTI Prices: HC$6.00 MF$1.25
Idaho Univ., Moscow. Engineering Experiment Station.
DEVELOPMENT OF AN ASPHALT PAVEMENT AIR PERMEAMETER AND EVALUATION OF ITS USE,
by N. C. Pyk, C. W. Hathaway, and C. C. Warnick. Sep 65, 214p

Descriptors: (*Pavements, Asphalt), (*Permeameters, Air), Bituminous coatings, Protective treatments, Sealing compounds, Maintenance, Civil engineering, Permeability, Test results.

Data were collected for this investigation of asphalt surfacing permeability with no concerted attempt made toward isolating any of the variables. It was believed that an analysis of a wide range of highway conditions and types would serve to determine the applicability of permeability as a criteria for sealcoating. The premise appears to be valid; however, the study does leave many questions unanswered concerning the relationship between permeability and the many variables. Further, since the time period in which data were collected was relatively short--less than six months--establishment of trends could not be done with reliability.

PB-173 489 **Field 13B, 8M**
CFSTI Prices: HC$2.00 MF$0.50
Rhode Island Univ., Kingston. Div. of Engineering Research and Development.
STABILIZATION OF SILTY SOILS WITH PORTLAND CEMENT AND SODIUM SULFATE,
by Vito A. Nacci, Kendall Moultrop, and Milton T. Huston. Aug 66, 42p Engineering Bull-9, 0390
Prepared in cooperation with Rhode Island Dept. of Public Works, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Soils, Stabilization), (*Silt, Stabilization), Cements, Sodium compounds, Sulfates, Soil mechanics, Additives, Freezing, Test methods, Density, Particle size, Pavements, Rhode Island.

Identifiers: Sodium sulfates.

The search for a chemical to improve the engineering properties of soil-cement was conducted on 18 granular soils having silt contents from 20 to 100 percent. Conventional strength and durability tests in addition to a laboratory designed frost heave apparatus were used to evaluate the effectiveness of the additives. The study revealed that of the additives tested, sodium sulfate was the most consistently effective in increasing strength and durability. A second phase of the investigation was to find a soil property that would be a reliable indicator of cement content requirements. The results show the factors most closely related to cement requirements are compacted density and median grain size. (Author)

PB-173 490 **Field 13B, 13C, 13M**
CFSTI Prices: HC$4.00 MF$1.00
New Mexico Univ., Albuquerque. Bureau of Engineering Research.
THE EFFECT OF HEIGHT OF HIGHWAY FILLS ON THE DESIGN OF CULVERTS. PHASE I. PRESSURE GAGE.
Final rept.,
by Wen Wang, and John B. Carney, Jr. Feb 66, 141p CE-4

Descriptors: (*Roads, Construction), (*Soil mechanics, Road building equipment), Pressure gages, Strain gages, Calibration, Foundations (Structures), Civil engineering, Soils.

The development of the pressure and strain gages is the first step or phase in a proposed study of pressures and strains in earth embankments around highway culverts. The second phase, as proposed, consists of installing pressure and strain gages in an actual embankment, selected, designed, and constructed by the New Mexico Highway Commission. The second phase is to be a pilot project, determining the pressure and strain distribution at one selected site. The third phase, as proposed, consists of installing the gages in the embankments around culverts at a number of different sites in New Mexico so that the effect of diameter of culvert, rigidity of culvert, type of soil, and height of fill on pressure and strain distribution within the soil mass around the culverts can be studied.

PB-173 493 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Arkansas State Highway Dept., Div. of Planning and Research.
EXPERIMENTAL PAVEMENT MARKINGS.
Final research rept.
Jun 65, 37p RR-63-2-65-Rev., 0648
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, Visual signals), (*Visual signals, Traffic), Plastics, Paints, Reflection, Maintenance, Costs, Life expectancy, Urban planning, Arkansas.

The purpose of this research project was to determine the feasibility of using plastic pavement markings on highways. The initial cost and maintenance of each type of marking and the length of time it remains in use under heavy traffic will be determining factors in the selection of suitable marking material.

PB-173 488 **See Field 11B**

PB-173 491 **See Field 13C**

PB-173 496 **See Field 8M**

PB-173 497 **See Field 8M**

13C. CONSTRUCTION EQUIPMENT, MATERIALS, AND SUPPLIES

PB-173 411 **Field 13C, 11G**
CFSTI Prices: HC$3.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
THE HARDENING OF ASPHALT IN HOT BITUMINOUS MIXES DURING THE HAULING PROCESS.
Final technical rept.,
by Paul H. Wright, and Radnor J. Paquette. Jun 66, 77p A-711, Rept. no. 0605
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Georgia, Research program administration), (*Asphalt, Hardening), Roads, Transportation, Cargo vehicles, Pavement, Viscosimeters, Temperature, Ductility, Bituminous coatings, Infrared spectrophotometers.

Identifiers: Highway engineering.

The research reported herein was performed at Georgia Tech under the sponsorship of Georgia Highway Department and the Bureau of Public Roads to determine the significance and seriousness of asphalt hardening during the period of haul. Samples of hot bituminous mix were taken from trucks traveling enroute from the mixing plant to the paving site at times of one, two, and four hours after preparation of the mix. In addition, mix samples were taken immediately after mixing, and after the material had been placed on the roadway. A total of about 100 field samples were taken from ten trucks, including asphalts manufactured from four sources of crude. (Author)

PB-173 491 **Field 13C, 13B**
CFSTI Prices: HC$2.00 MF$0.50
Virginia Highway Research Council, Charlottesville.
REACTIONS IN PORTLAND CEMENT-CLAY MIXTURES. PHASE 2. REACTIONS AND STRENGTH DEVELOPMENT IN PORTLAND CEMENT-CLAY MIXTURES,
by David F. Noble. Aug 66, 42p Rept. no. 0630
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Cements, Aging (Materials)), (*Clay, Degradation), Mixtures, Chemical analysis, Roads, Soils, Crystallization, Adhesives, Bonding, Particles.

This is an interim report concerning the study of the reactions and rates of reactions in mixtures of cement and relatively pure clays. Mixtures of three clays containing 40 percent cement were prepared and cured at 100 percent relative humid-

ity and 25C for 3, 7, 14, 56, and 112 days. Cured mixtures were studied by petrographic microscope, X-ray diffraction, pH measurements of dilute suspensions and analyses of leachates made with distilled water and hydrochloric acid. Among the author's conclusions are: (1) cement hydrates most rapidly in Anna Kaolinite mixtures, cement hydrates 1/2 to 3/4 as rapidly in cement-Fithian Illite mixtures and most slowly in mixtures containing Aberdeen montmorillonite; (2) strength gain results from flocculation of clay, hydration of cement and crystallization of Ca (OH)2 and (3) hydrating cement caused deterioration of clays.

PB-173 362 See Field 13B

PB-173 368 See Field 11G

PB-173 421 See Field 13B

PB-173 487 See Field 13B

PB-173 488 See Field 11B

PB-173 490 See Field 13B

PB-173 495 See Field 13M

13D. CONTAINERS AND PACKAGING

AD-224 277 See Field 9C

13E. COUPLINGS, FITTINGS, FASTENERS, AND JOINTS

N66-38104 Field 13E
CFSTI Prices HC$7.85 MF$2.50
Standard Pressed Steel Co., Jenkintown, Pa.
EVALUATION OF FASTENERS AND FASTENER MATERIALS FOR SPACE VEHICLES FINAL REPORT, NOV. 1963 - NOV. 1965.
by J. J. Glackin, and E. F. Gowen Jr. 31 Dec 65, 486p NASA-CR-78442
Contract NAS8-11125

Descriptors: *Fastener, *High strength alloy, *Space vehicle, Alloy, Base, Corrosion, Evaluation, Impact, Iron, Nickel, Resistance, Stress, Temperature, Tensile, Test.

For abstract, see STAR 04 23.

PB-173 405 Field 13E
CFSTI Prices: HC$1.00 MF$0.50
Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
CALIBRATION TEST OF A490 HIGH-STRENGTH BOLTS,
by John W. Fisher, Gordon H. Sterling, Emile W. J. Troup, and Eugene Chesson, Jr. 1965, 21p
Fritz Reprint-273
Journal of the Structural Division, Proceedings of the American Society of Civil Engineers Proc. Paper 4515 v91 (St5) p279-98 Oct 1965.

Descriptors: (*Structural properties, *Bolts), Calibration, Physical properties, Tensile properties, Test methods, Steel, Torque, Loading (Mechanics).

Tests were conducted on two lots of A490 bolts at Lehigh University and the University of Illinois to determine if testing procedures constitute a variable. Over 100 calibration tests were conducted of 7/8-in. by 5 1/2-in. and 7/8-in. by 9 1/2-in. ASTM A490 high-strength bolts. These included 40 direct tension tests and 60 torqued-tension tests. The torqued-tension tests were conducted in hydraulic calibrating devices and in solid steel blocks. Data on bolt tension, elongation, turns-of-nut, and general behavior were analyzed. The tests showed no significant difference between the results obtained at the two universities. The tests showed that the direct tensile strength was 10% to 20% greater than the torqued tension strength. Only the shorter bolts (7/8-in. by 5 1/2-in.) reached proof load after one-half turn from snug. Comparisons of bolt behavior when torqued in the hydraulic bolt calibrator and in the solid steel block showed that less load was induced into the bolt at one-half turn in the hydraulic calibrator. This study shows that additional rotation beyond one-half turn is necessary for the longer A490 bolt if the proof load is to be reached. (Author)

13F. GROUND TRANSPORTATION EQUIPMENT

AD-408 653 Field 13F, 19C
CFSTI Price: HC$4.00
Development and Proof Services, Aberdeen Proving Ground, Md.
ROAD SHOCK AND VIBRATION ENVIRONMENT FOR A SERIES OF WHEELED AND TRACK-LAYING VEHICLES.
Rept. for Mar-Jun 63,
by H. T. Cline. Jun 63, 143p DPS-999

Descriptors: (*Vehicles, Tests), (*Shock (Mechanics), Vehicles), (*Vibration, Vehicles), Armored vehicles, Cargo vehicles, Passenger vehicles, Tanks (Combat vehicles), Tracked vehicles, Test methods, Magnetic tape, Computers.

The road shock and vibration environment created by four wheeled and five track-laying vehicles was measured on eight test courses at speed increments of approximately 4 mph. The magnetic-tape data were processed through a special-purpose computer which determined the amplitude-probability distribution and spectral density. The resultant data have been catalogued in a form which will provide a base line for the design of equipment to be transported on automotive vehicles. (Author)

AD-641 356 Field 13F
CFSTI Prices: HC$3.00 MF$0.75
Army Tank-Automotive Center, Warren, Mich.
SYSTEM DESCRIPTION FOR TRUCK, UTILITY: 1 1/4 TON XM705 TRUCK, AMBULANCE: 1 1/4 TON XM737.
31 Aug 66, 75p

Descriptors: (*Cargo vehicles, Armed forces transportation), (*Ambulances, Armed forces transportation), Performance (Engineering), Design, Tests, Military requirements, Systems engineering.

This system description establishes the performance, design, development, and test requirements for the Truck Utility 1 1/4 ton XM705 and the Truck Ambulance 1 1/4 ton XM737.

AD-641 644 Field 13F, 14A, 15E
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
COST-EFFECTIVENESS CONSIDERATIONS IN THE DESIGN AND EMPLOYMENT OF ARMY OFF-ROAD VEHICLES,
by D. M. Fort. Sep 66, 55p P-3456

Descriptors: (*Vehicles, Army equipment), (*Cost effectiveness, Vehicles), Design, Military requirements.

The paper discusses the design and employment of off-road transport vehicles for forward-area support of Army ground forces in combat. Following the Bekker-Butterworth approach in broad outline, consideration is given to suitable operational requirements, specific vehicle configurations meeting these requirements, and appropriate measures of system cost and system effectiveness. The requirements emphasize survivability under fire, airliftability, swimming capability, large-obstacle and soft-soil capability, and design for high-density cargo. Large-wheel articulated vehicles, multi-wheel vehicles, and tracked vehicles are considered. No attempt is made to estimate or compare vehicle performance or to identify preferred systems, but some problems encountered in these areas are noted. It is suggested that improved off-road vehicles may be worth large expenditures for vehicle development and procurement, as a means of increasing system effectiveness relative to system cost. (Author)

PB-173 473 Field 13F
CFSTI Prices: HC$2.00 MF$0.50
Tri-State Transportation Commission, New York.
STATION FARE COLLECTION KEW GARDENS-FOREST HILLS QUEENS COUNTY, NEW YORK.
Final rept. 1 Jul 64-30 Jun 65.
30 Jun 65, 45p
Rept. on Mass Transportation Demonstration Proj.

Descriptors: (*Railroads, Automata), Magnetic recording systems, Feasibility studies, Traffic, Input-output devices, Malfunctions, Maintenance, Costs, Transportation.

Identifiers: Automatic fare collection systems, Magnetic tickets.

The demonstration project at two stations on the Long Island Rail Road was designed to test and evaluate newly developed automatic ticket encoding and cancellation equipment under actual operating conditions in suburban railroad stations. Automated station fare collection is a system of validating and collecting passenger fares at stations rather than on trains. On the whole the demonstration was well received by the riding public. Mechanical and functional problems occurred from time to time, but at no time did they create significant interference with normal passenger flow. The results of this demonstration have influenced the development of new ticket readers. Magnetic-surface paper tickets have been substantially improved and manufacturing costs are reported to have been reduced.

13G. HYDRAULIC AND PNEUMATIC EQUIPMENT

N66-37679 Field 13G
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN OF A FLUID JET AMPLIFIER WITH REDUCED RECEIVER-INTERACTION-REGION COUPLING.
by W. S. Griffin. Oct 66, 29p NASA-TN-D-3651
Contract 122-29-03-09-22

Descriptors: *Amplifier design, *Fluid jet amplifier, *Reversed flow, Bistable, Control, Coupling, Flow, Interaction, Loading, Pressure, Receiver, Reduction, Region.

For abstract, see STAR 04 23.

13H. INDUSTRIAL PROCESSES

AD-453 901 Field 13H, 11F
CFSTI Prices: HC$3.00 MF$0.50
Naval Weapons Lab., Dahlgren, Va.
EXPLOSIVE HARDENING OF IRON AND LOW-CARBON STEEL,
by L. A. Potteiger. 14 Oct 64, 57p NWL-1950

Descriptors: (*Iron, Hardening), (*Steel, Hardening), Explosive materials, Explosive forming, Metal plates, Thickness, Cold working, Shock waves, Microstructures.

The degree and depth of shock hardening in iron and low-carbon steel plates was experimentally determined by detonating C-3 explosive against the plates. Final hardness levels were not strongly

influenced by the magnitude of the pressure above the critical value of 130 kilobars or by explosive thickness of plate thickness, but were dependent upon the original hardness of the plate. The relative widths of the two hardness plateaus through the plates were found to depend upon explosive thickness, plate thickness, and applied pressure; a simple explanation for this dependence is presented in terms of the interaction of two shocks in the metal. The relationship of hardness and tensile strength was found to be about the same whether hardening was done explosively or by cold-working. (Author)

AD-641 354 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
Automation Industries, Inc., Boulder, Colo. Research Div.
ADVANCEMENT OF ULTRASONIC TECHNIQUES USING RERADIATED SOUND ENERGIES FOR NONDESTRUCTIVE EVALUATION OF WELDMENTS.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 66, by B. T. Cross, and W. M. Tooley. 5 Oct 66, 23p TR-66-42
Contract NObs-92530
Proj. SR007-10-04
Task 891
See also AD-641 026.

Descriptors: (*Welds, Non-destructive testing), (*Ultrasonic radiation, Non-destructive testing), Steel, Defects (Materials), Ultrasonic welding.

The report describes the use of the Delta Configuration with a dual oscillating transmitter, a fixed divergent transmitter and a single oscillating divergent transmitter for inspecting steel butt welds. Schlieren studies of the transmitter configuration are included. The Delta Technique is a multisearch unit method of ultrasonic weld inspection. Incident energy is angled into the weld region from two transmitters positioned transverse to the weld length, one on each side of the weld. Flaw information is received with a third search unit positioned directly over the weld. Flaw information is not dependent on preferred flaw orientation, although the receiver must be directly over the defect. (Author)

AD-641 407 **Field 13H**
CFSTI Prices: HC$4.00 MF$0.75
Martin Co., Denver, Colo. Center for High Energy Forming.
QUARTERLY TECHNICAL PROGRESS REPORT NO. 5, OF TECHNICAL PROGRESS,
by Gaylen A. Thurston. Oct 66, 106p
Contract DA-19-066-AMC-266 (X)
AMRA-CR-66-05/6
Prepared in cooperation with Denver Univ., Colo., See also AD-635 486.

Descriptors: (*Explosive forming, Reports), Hardening, Strain (Mechanics), Deformation, Ductility, Dies, Maraging steels, Nickel alloys, Shock (Mechanics).

Identifiers: HERF.

The first section describes the studies performed on shock hardening and strain rate effects. The second section discusses efforts in predicting strains in blanks formed into dies and in experimental work in material ductility in explosive forming and in blank stabilization. The third section contains a complete report of a literature survey of shock hardening effects on 18 per cent nickel maraging steel. (Author)

AD-641 408 **Field 13H, 13M**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF PRACTICE FOR COMPOSITE ROLLING OF STRUCTURAL METAL PANELS.
Quarterly rept. no. 3, 15 May-15 Aug 66, by K. R. Grube, J. R. Van Orsdel, and E. S. Bartlett. Aug 66, 58p
Contract DA-19-066-AMC-308 (X)
Proj. DA-A1-65-11111-01-A1-AW
AMRA-CR-66-02/3
See also AD-636 588.

Descriptors: (*Sandwich panels, *Rolling (Metallurgy)), Welding, Bonding, Stainless steel, Nickel alloys, Chromium alloys, Iron alloys, Titanium alloys, Titanium, Beryllium, Silver, Panels (Structural), Degasification.

Identifiers: Inconel (Alloys), Titanium alloy 4 al, Stainless steel PH14-8 Mo.

Structural panels prepared of Inconel and the alpha-titanium alloy Ti-4A1-0.202 were successfully bonded by the roll-welding process. The use of a reactive metal in the assembled pack to getter gaseous impurities appears to aid the bonding of the faying surfaces of the PH 14-8Mo alloy. Satisfactory titanium-beryllium composite strip were produced using silver as a diffusion barrier. (Author)

AD-641 974 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
USE OF LOW-MELTING METAL ALLOYS FOR CASTING AND TRANSFER MOLDING OF HOLLOW PLASTIC SPHERES,
by S. A. Slota. Nov 66, 12p
PA-TR-3320

Descriptors: (*Plastics, Spheres), (*Casting, Plastics), (*Molding, Plastics), (*Low-temperature alloys, *Molding), Aluminum, Epoxy plastics, Casting.

In order to produce a hollow plastic ball with only a small opening at one point, a core insert, made from a low melting alloy, was used in both a casting mold and a transfer mold. In the casting process, the plastic was poured into the mold as a liquid and cured at room temperature. In the transfer process, the plastic was forced into the mold cavity under pressure (3000 psi) and cured at 310F. In both cases, the finished ball (with insert inside) was heated in a mineral oil bath at 350F to melt the core. This melted core material was poured out of the plastic ball through the small opening and was reused for casting additional cores. (Author)

N66-32787 **Field 13H**
CFSTI Prices HC$2.00 MF$0.50
Boeing Co., Seattle, Wash. Aerospace Group.
STATE-OF-THE-ART SURVEY OF DISSIMILAR METAL JOINING BY SOLID STATE WELDING.
by W. A. Baginski, C. H. Crane, D. T. Lovell, and R. T. Torgerson. 27 Aug 65, 50p NASA-CR-76933
Contract NAS8-20156

Descriptors: *Aluminum alloy, *Diffusion bonding, *Metal joint, *Pressure welding, *Solid state, *Stainless steel, Alloy, Aluminum, Annotation, Bibliography, Bonding, Diffusion, Dissimilar, Explosive, Gas, Joint, Metal, Nickel, Pressure, Resistance, Solid, Stainless, State, Steel, Temperature, Titanium, Welding.

For abstract, see STAR 04 19.

N66-32924 **Field 13H**
CFSTI Prices HC$3.75 MF$1.25
Westinghouse Electric Corp., Lima, Ohio. Aerospace Electrical Div.
DEVELOPMENT AND EVALUATION OF MAGNETIC AND ELECTRICAL MATERIALS CAPABLE OF OPERATING IN THE 800 DEG TO 1600 DEG F TEMPERATURE RANGE THIRD QUARTERLY REPORT, 1 JUN. - 31 AUG. 1965.
by P. E. Kueser. Sep 65, 205p NASA-CR-54356, WAED-65.52E
Contract NAS3-6465

Descriptors: *High temperature material, *Magnetic material, *Power supply, Advance, Alloy, Alpha, Bore, Capacitor, Cobalt, Electric, Electric power, Gamma, High temperature, Iron, Magnetic, Material, Mechanical, Power, Property, Rotor, Seal, Solenoid, Space, Supply, System, Transformation, Transformer.

For abstract, see STAR 04 19.

N66-32958 **Field 13H**
CFSTI Prices HC$2.00 MF$0.50
Debell And Richardson, Inc., Hazardville, Conn.
PRECISION WINDING OF CYLINDRICAL COMPOSITES WITH SHAPED GLASS FILAMENTS.
by R. A. Humphrey. Aug 66, 44p NASA-CR-517
Contract NASW-1100

Descriptors: *Composite material, *Cylinder, *Filament winding, *Glass fiber, Composite, Data, Elasticity, Fiber, Filament, Glass, Hollow, Honeycomb, Material, Mechanical, Property, Shape, Solid, Structure, Winding.

For abstract, see STAR 04 19.

N66-32965 **Field 13H**
CFSTI Prices HC$2.00 MF$0.50
Martin Co., Denver, Colo.
INVESTIGATION OF THE RELIABILITY OF STERILE INSERTION TECHNIQUES FOR SPACECRAFT MONTHLY LETTER REPORT, 23 JUN. - 23 JUL. 1966.
by L. Sullivan. Jul 66, 48p NASA-CR-76996, VOY-CR-66-6
Contract NASW-1047

Descriptors: *Contamination, *Isolator, *Microbiology, *Spacecraft component, *Sterilization, Component, Equipment, Facility, Hole, Method, Missile, Procedure, Size, Spacecraft, Sterility, Test.

For abstract, see STAR 04 19.

N66-33538 **Field 13H**
CFSTI Prices HC$3.00 MF$1.00
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE FABRICATION OF BERYLLIUM. VOLUME I - A SURVEY OF CURRENT TECHNOLOGY.
Jul 66, 149p NASA-TM-X-53453

Descriptors: *Beryllium alloy, *Sheet metal, *Spacecraft structure, Alloy, Beryllium, Brittleness, Fabrication, Metal, Rod, Sheet, Spacecraft, Structure.

For abstract, see STAR 04 19.

N66-33977 **Field 13H**
CFSTI Prices HC$2.50 MF$0.75
Aerojet-general Corp., Sacramento, Calif. Liquid Rocket Operations.
SUMMARY OF MATERIALS TECHNOLOGY OF M-1 ENGINE.
by G. R. Janser. 22 Jul 66, 85p NASA-CR-54961, AGC-8800-64
Contract NAS3-2555

Descriptors: *Lox-hydrogen engine, *M- 1 rocket engine, *Materials science, *Physical property, *Stainless steel, Alloy, Coating, Cryogenic, Engineering, Evaluation, Hydrogen, Inconel, Liquid, Material, Oxygen, Physical, Property, Rocket engine, Stainless, Steel, Titanium.

For abstract, see STAR 04 19.

N66-34048 Field 13H
CFSTI Prices HC$1.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
AN EVALUATION OF A BAKEOUT PROCEDURE FOR SMALL GLASS ULTRAHIGH VACUUM SYSTEMS.
by F. Steinrisser. Jun 66, 17p NASA-CR-77252, R-299
Grant NSG-376, Contract DA-28-043-AMC-00073/E/

Descriptors: *Glass, *Ultrahigh vacuum, *Vacuum equipment, Bakeout, Degassing, Diffusion, Engineering, Equipment, Heating, Performance, Procedure, Pump, System, Ultrahigh, Vacuum.

For abstract, see STAR 04 19.

N66-34066 Field 13H
CFSTI Prices HC$4.00 MF$0.75
Iit Research Inst., Chicago, Ill.
GRAPHITE-METAL COMPOSITES FINAL REPORT, 1 AUG. 1965 - 31 JUL. 1966.
by Y. Harada. 1 Aug 66, 110p NASA-CR-77114
Contract NASR-65/09/

Descriptors: *Composite material, *Graphite, *Hot pressing, *Metal carbide, Carbide, Composite, Effect, High strength, High temperature, Material, Mechanical, Metal, Physical, Property, Temperature.

For abstract, see STAR 04 19.

N66-37678 Field 13H
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
FEASIBILITY STUDY OF SECONDARY EMISSION ELECTRON MICROSCOPY FOR EXAMINING MATERIALS CONTAINING DISPERSED OXIDE PARTICLES.
by W. S. Cremens, and L. F. Norris. Oct 66, 51p NASA-TN-D-3650
Contract 129-03-01-05-22

Descriptors: *Electron microscopy, *Secondary emission, Aluminum, Dispersion, Image, Material, Metal, Metallography, Micrography, Microstructure, Nickel, Oxide, Particle, Tungsten.

For abstract, see STAR 04 23.

N66-38500 Field 13H
CFSTI Prices HC$3.75 MF$1.75
Union Carbide Corp., Tonawanda, N. Y. Linde Div.
INVESTIGATION OF A LIGHTWEIGHT SELF-EVACUATING PREFABRICATED MULTILAYER INSULATION SYSTEM FOR CRYOGENIC SPACE PROPULSION STAGES FINAL REPORT, 3 JUN. 1965 - 31 JUL. 1966.
by L. R. Niendorf, and G. E. Nies. 15 Jul 66, 293p NASA-CR-72012
Contract NAS3-6289

Descriptors: *Cryogenic equipment, *Insulation, *Multilayer structure, *Mylar, *Propulsion, Aluminization, Analysis, Calorimeter, Carbon, Casing, Cryogenic, Cryopumping, Dioxide, Evacuation, Fabrication, Lightweight, Material, Space, Stage, Tank, Test, Thermal, Vacuum.

For abstract, see STAR 04 23.

N66-38744 Field 13H
CFSTI Prices HC$3.00 MF$0.75
Automation Industries, Inc., Danbury, Conn. Engineering Dept.
DEVELOPMENT OF A RING BEAM WHEEL SURFACE WAVE SEARCH UNIT FINAL REPORT.
by A. M. Murdoch. 11 Apr 66, 85p NASA-CR-76361
Contract NAS8-11454

Descriptors: *Inspection, *Scanning, *Surface crack, *Weld strength, Automatic, Beam, Defect, Material, Ring, Search, Surface, Ultrasonic, Unit, Wave, Welding, Wheel.

For abstract, see STAR 04 23.

N66-38757 Field 13H
CFSTI Prices HC$2.50 MF$0.75
Aerojet-general Corp., Sacramento, Calif. Liquid Rocket Operations.
FABRICATION OF LIGHTWEIGHT TURBINE COMPONENTS USING ELECTRON-BEAM WELDING FOR THE ATTACHMENT OF SHEET METAL BLADES TO DISCS AND SHROUDS.
by R. Beer. 14 Oct 66, 88p NASA-CR-54814, AGC-8800-49
Contract NAS3-2555

Descriptors: *Electron beam welding, *M-1 rocket engine, *Turbopump, Blade, Component, Disk, Fabrication, Inconel, Lightweight, Metal, Nozzle, Oxidizer, Rotor, Sheet, Shroud, Vane.

For abstract, see STAR 04 23.

N66-38792 Field 13H
CFSTI Prices HC$2.00 MF$0.50
Hittman Associates, Inc., Baltimore, Md.
THERMOELECTRIC BONDING STUDY QUARTERLY PROGRESS REPORT, 1 APR. - 30 JUN. 1966.
Aug 66, 46p NASA-CR-78598, HIT-221
Contract NAS5-3973

Descriptors: *Bonding, *Lead telluride, *Thermoelectric material, Additive, Degradation, Effect, Electric, Equipment, Lifetime, Performance, Property, Resistance, Shoe, Stainless, Steel, Strength, Testing.

For abstract, see STAR 04 23.

AD-455 918 See Field 19G

AD-480 198 See Field 20K

AD-641 401 See Field 9A

AD-641 409 See Field 9A

AD-641 411 See Field 9A

AD-641 461 See Field 9E

AD-641 485 See Field 19A

AD-641 606 See Field 9A

AD-641 613 See Field 9A

AD-641 662 See Field 11F

AD-641 663 See Field 7D

AD-641 720 See Field 14B

AD-641 857 See Field 12A

AD-641 877 See Field 9A

AD-641 904 See Field 11L

AD-641 930 See Field 11F

N66-37781 See Field 18I

13I. MACHINERY AND TOOLS

AD-471 437 Field 13I, 1C
CFSTI Prices: HC$4.60 MF$0.50
TRW, Inc., Cleveland, Ohio. TRW Accessories Div.
ENDURANCE TEST OF AN-1 ROLLER GEAR DRIVE.
Engineering Rept.
Aug 65, 50p TRW-ER-6371
Contract DA-44-177-AMC-30 (T)
Proj. 1M121401D14404
AAVLABS-TR-65-31

Descriptors: (*Transmission gears, Helicopters), Transmissions, Instrumentation, Design, Calibration, Stresses, Life expectancy.

This report presents a review of the 1,000-hour endurance test of the roller gear power transmission. The primary purpose of this program was to determine the feasibility of roller gear drive arrangements for power reductions in helicopter transmissions and to determine critical design parameters for the drive. An endurance run was made for 1,000 hours on two roller gear drives mounted in a back-to-back test rig with a 200-horsepower load applied continuously with the high-speed shaft at 28,000 rpm and the low-speed shaft at 600 rpm in each box, an instrumentation system was provided to measure loads, speeds, oil flows, and temperatures, and to measure vibration levels. The test has confirmed that the roller gear drive is feasible for helicopter power reductions and has the ability to accept high input speeds and to accomplish high ratio reductions in one plane with very high efficiency, 98.5% or better with a high degree of mechanical reliability. (Author)

N66-32922 Field 13I
CFSTI Prices HC$3.00 MF$1.00
Skf Industries, Inc., King Of Prussia, Pa. Research Lab.
SUPERSONIC TRANSPORT LUBRICATION SYSTEM INVESTIGATION THIRD SEMIANNUAL REPORT, 1 NOV. 1965 - 1 MAY 1966.
by W. L. Rhoads, and L. B. Sibley. 20 May 66, 133p NASA-CR-54313, AL66T032
Contract NAS3-6267

Descriptors: *Ball bearing, *Gas turbine, *Lubrication system, *Oil, *Supersonic aircraft, Aircraft, Ball, Bearing, Bellows, Engine, Face, Gas, Jet, Lubricant, Lubrication, Main, Mist, Seal, Shaft, Supersonic, System, Test, Transport, Turbine.

For abstract, see STAR 04 19.

N66-32962 Field 13I
CFSTI Prices HC$4.00 MF$0.75
Ampex Corp., Redwood City, Calif.
ANALYZATION, DESIGN, FABRICATION, AND TESTING OF A FOIL BEARING ROTOR SUPPORT SYSTEM FINAL TECHNICAL REPORT.
by A. Huckabay, and A. F. Stahl. Jun 66, 111p NASA-CR-76997, RR-66-21
Contract NASW-1221

Descriptors: *Foil bearing, *Journal bearing, *Rotor system, *Support system, Angle, Bearing, Design, Fabrication, Foil, Gas, Lubrication, Rotor, Shaft, Speed, Stress, Support, System, Torque, Vibration, Wrap.

For abstract, see STAR 04 19.

N66-38491 Field 13I
CFSTI Prices HC$2.00 MF$0.50
Pratt And Whitney Aircraft, East Hartford, Conn.
BRAYTON-CYCLE TURBOMACHINERY ROLLING-ELEMENT BEARING SYSTEM FOURTH QUARTERLY REPORT, 2 APR. - 2 JUL. 1966.
by H. Means. Aug 66, 42p NASA-CR-72072, PWA-2897
Contract NAS3-7635

Descriptors: *Brayton cycle, *Contamination, *Rolling contact bearing, *Turbomachine, Adsorbent, Argon, Configuration,

Decomposition, Element, Glass, Hydrogen, Oil, Wool.

For abstract, see STAR 04 23.

N66-37936 **See Field 20K**

13J. MARINE ENGINEERING

AD-205 742 **Field 13J**
CFSTI Price: HC$1.60
Industrial Lab, Mare Island Naval Shipyard, Vallejo, Calif.
STABILIZATION OF MONETHANOLAMINE WITH COPPER SULFATE AND POTASSIUM IODIDE IN THE MARE ISLAND CO2 SCRUBBER,
by W. W. Johnson, and M. Lew. 3 Sep 58, 12p
Rept. no. 5715-58

Descriptors: (*Submarines, Absorption), Amides, Carbon dioxide, Ethanols, Iodides, Potassium compounds, Ventilation.

The addition of potassium iodide and copper sulfate to the monoethanolamine absorbent of the Mare Island CO2 Scrubber has resulted in improvement with respect to monoethanolamine makeup rate, sodium bisulfate consumption rate, and air contamination. The improvement exceeds that obtained with copper sulfate as the only additive.

AD-406 277 **Field 13J, 9B**
CFSTI Price: HC$8.60
Todd Shipyards Corp., San Pedro, Calif.
DEVELOPMENT AND TESTING OF PROGRAMMING SYSTEM FOR NUMERICALLY CONTROLLED FLAME CUTTING OF SHIP PARTS. VOLUME 5. SUMMARY REPORT.
Final rept., Apr 61-Mar 63.
Mar 63, 89p TR-5-5-0
Contract NObs-4427

Descriptors: (*Programming (Computers), *Positioning devices (Machinery)), Computers, Input-output devices, Ship structural components, Magnetic tape, Torches.

Identifiers: Automap II language.

Efforts were directed to: the background work leading to the development of the system; revised specifications for an automatic parts programming language for shipyard requirements; a study and comparison of available automatic parts programming languages; results of production testing of the system; a discussion of the economies of numerically controlled flame cutting; conclusions drawn from experience to date; recommendations for future action. (Author)

AD-641 333 **Field 13J**
CFSTI Prices: HC$2.00 MF$0.50
Ship Structure Committee, Washington, D. C.
BIENNIAL REPORT OF THE SHIP STRUCTURE COMMITTEE.
Rept. for 1 Nov 64-1 Jun 66.
1 Jun 66, 29p SSC-176

Descriptors: (*Ships, Construction), Research program administration, Reviews, Ship structural components.

Contents: Authority for the Ship Structure Committee; Organization of the Ship Structure Committee; Current Ship Structure Committee organization directory; Research projects and reports; Five year program for Ship Structure Committee research; American Council of the International Institute of Welding; Statistical report of structural failures of steel merchant ships to March 1966.

AD-641 337 **Field 13J**
CFSTI Prices: HC$3.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
THE INVERSE PROBLEM OF THE ANNULAR AIRFOIL AND DUCTED PROPELLER.
Research and development rept.,
by William B. Morgan, and Robert G. Voigt. Sep 66, 59p DTMB-2251
Proj. S-R011-01-01
Task 0401

Descriptors: (*Shrouded propellers, *Propellers (Marine)), (*Shroud rings, Airfoils), Pressure, Distribution, Loading (Mechanics), Geometric forms.

A computer program is presented that calculates the annular airfoil shape from a given pressure distribution. A brief review of the theory of the inverse problem of the annular airfoil is also presented. The distortion of the duct shape by the presence of an axisymmetric body or a propeller may be taken into consideration. Calculations show that for a given pressure distribution, the propeller loading and location affect the duct shape. (Author)

AD-641 372 **Field 13J, 8C**
CFSTI Prices: HC$3.00 MF$0.50
Hydronautics, Inc., Laurel, Md.
THE DYNAMIC PRESSURE TRACE AT THE SEA BOTTOM CREATED BY A GROUND EFFECT MACHINE.
Technical rept.,
by T. T. Huang, and K. K. Wong. Feb 66, 54p TR-505-1
Contract Nonr-4695 (00)
Proj. SR-009-01-01

Descriptors: (*Ground effect machines, Fluid dynamic properties), (*Ocean bottom, Pressure), Dynamics, Ocean waves, Numerical analysis, Boundary value problems.

The theory was derived for the dynamic pressure trace at the sea bottom and the surface waves created by a ground effect machine of rectangular planform moving with constant velocity over quiescent water of finite depth. The numerical results for the dynamic pressure trace at the sea bottom are presented. Because of convergence difficulties, the numerical calculation of the exact surface wave contour was not completed. However, the convergence characteristics were improved by deforming the path of integration. Further effort is necessary in order to obtain the numerical results for the surface waves, For very shallow water, solutions for both the pressure trace and surface wave contour were obtained. (Author)

AD-641 664 **Field 13J, 18F**
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
A COMPUTER CODE FOR ESTIMATING THE PROTECTION OFFERED BY SHIPS AGAINST FALLOUT, BASE SURGE, OR WATER POOL RADIATION,
by James M. Ferguson. 18 Nov 65, 31p
USNRDL-TR-1079
Proj. SF-011-05-12
Task 0506

Descriptors: (*Ships, *Shielding), (*Gamma rays, Shielding), Programming (Computers), Mathematical prediction, Effectiveness, Radioactive fallout, Nuclear weapons.

The report describes a method for estimating the shielding effectiveness of ships against various types of gamma radiation fields. The method actually can be used for a wide variety of complex structures. The ship or structure is represented by a set of rectangles whose number, orientations, sizes, and thicknesses are variable. The direct radiation is calculated exactly, and the scattered radiation is approximated by buildup factors. It was found that the calculations agree well with experiment if it is assumed that the contribution due to scattered radiation is about half that given by infinite medium buildup factors. (Author)

AD-641 708 **Field 13J, 20D**
CFSTI Prices: HC$4.00 MF$0.75
Stanford Univ., Calif. Dept. of Civil Engineering.
A NONLINEAR THEORY FOR FULLY CAVITATING FLOWS PAST AN INCLINED FLAT PLATE.
Technical rept.,
by Bruce E. Larock, and Robert L. Street. Jun 66, 110p TR-64
Contract Nonr-225 (56)

Descriptors: (*Hydrofoils, *Cavitation), Hydrofoil boats, Design, Fluid flow, Boundary value problems, Gravity, Lift, Drag.

The work considers a three-part sequence of problems in fully-cavitating flow theory which have practical applications in the design of hydrofoil vessels. In each problem a two-dimensional, inviscid, incompressible, irrotational flow is assumed. Results in each case include expressions for the physical-plane configuration and the lift and drag coefficients; they are developed by using conformal mapping and the solution to a Riemann-Hilbert mixed-boundary-value problem in an auxiliary half plane. The first part develops a nonlinear solution for a flat plate in an infinite flow field with gravity neglected. The remaining two parts are extensions of part one to consider in one case the effect of a free surface above the hydrofoil, and in the other case, the effect of a transverse gravity field on the initial problem. The use of a digital computer to perform numerical integrations is a feature common to the solution of all three problems. The solution to the gravity-affected case was found from the nongravity solution via a rapidly convergent iteration process. The results in each case agree well with other nonlinear and linear solutions. (Author)

AD-641 875 **Field 13J, 11B, 13M**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.
AN EXPLORATORY STUDY OF THE FEASIBILITY OF GLASS AND CERAMIC PRESSURE VESSELS FOR NAVAL APPLICATIONS.
Final rept.,
by Thomas J. Kiernan. Sep 66, 36p
Proj. S-F013-01-03
Task 0222
DTMB-2243

Descriptors: (*Submarine hulls, Deep submergence), (*Pressure vessels, Ceramic materials), Glass, Spheres, Aluminum compounds, Oxides, Structural shells, Model tests, Loading (Mechanics), Compressive properties.

An exploratory study was conducted to determine the feasibility of using glass and ceramic materials for deep-submergence pressure hulls. In general, the study confirmed the potential use of these materials in pressure hulls capable of withstanding pressures at the deepest part of the ocean with very little structural weight. However, the study also showed that very little is known about the behavior of glass and ceramic structures under high-compressive loading and that a great deal of basic data must be generated before this potential can be achieved. The use of simple spheres of glass and ceramic materials for providing buoyancy is considered to be the most promising near-future application. (Author)

AD-447 732 **See Field 20D**

AD-641 842 **See Field 20D**

PB-173 247 **See Field 9A**

13K. PUMPS, FILTERS, PIPES, FITTINGS, TUBING, AND VALVES

N66-32803 **Field 13K**
CFSTI Prices HC$2.50 MF$0.75
Tennessee Univ., Knoxville. Dept. Of Mechanical And Aerospace Engineering.
ANALYSIS OF THE VISCO SEAL. PART II - THE CONCENTRIC TURBULENT CASE.
by R. H. Hale, and W. K. Stair. 28 Jun 66, 99p
NASA-CR-76866, ME-66-587-7
Grant NSG-587

Descriptors: *Navier-stokes equation, *Sealing, *Turbulent flow, *Viscosity, Analysis, Approximation, Coefficient, Equation, Flow, Method, Power, Rotating, Seal, Series, Theoretical, Turbulent.

For abstract, see STAR 04 19.

N66-33494 **Field 13K**
CFSTI Prices HC$3.00 MF$1.00
Vickers, Inc., Troy, Mich. Research And Development Dept.
DEVELOPMENT OF A PROPORTIONAL TWO STAGE PRESSURE FEED BACK PNEUMATIC VALVE FOR 2000 DEG F SOLID PROPELLANT SYSTEMS REPORT, JUL. 6, 1965 - MAY 20, 1966.
Jul 66, 121p NASA-CR-66156
Contract NAS1-4102

Descriptors: *Closed loop system, *Control valve, *High temperature propellant, *Pneumatic equipment, *Solid propellant, Closed, Control, Dynamic, Equipment, Feedback, Flight, Flow, High temperature, Logic, Loop, Pneumatic, Pressure, Propellant, Proportion, Solid, Stage, System, Two, Valve, Weight.

For abstract, see STAR 04 19.

N66-33498 **Field 13K**
CFSTI Prices HC$2.00 MF$0.50
Bendix Corp., Southfield, Mich. Research Labs. Div.
DESIGN, FABRICATION AND TEST OF A FLUERIC SERVOVALVE QUARTERLY REPORT, 28 DEC. 1965 - 28 MAR. 1966.
by C. E. Vos. 1966, 39p NASA-CR-72023, BRLD-3395
Contract NAS3-7980

Descriptors: *Pneumatic equipment, *Servomechanism, Breadboard, Design, Equipment, Fabrication, Fluid, Hydrogen, Input, Nitrogen, Pneumatic, Working.

For abstract, see STAR 04 19.

AD-641 842 **See Field 20D**

AD-641 856 **See Field 20D**

13L. SAFETY ENGINEERING

AD-641 670 **Field 13L**
CFSTI Prices: HC$2.00 MF$0.50
Federal Aviation Agency, Washington, D. C. Aircraft Development Service.
AN EVALUATION OF LOW-COST CARBON MONOXIDE INDICATORS.
Technical rept.,
by Gerald R. Slusher. Jul 66, 36p ADS-80
Proj. FA-520-003-01X

Descriptors: (*Carbon monoxide indicators, Performance (Engineering)), Airborne, Effectiveness.

The 'Detector' reacts to provide color warning to indicate the presence of minute concentrations of carbon monoxide in an atmosphere contaminated with engine exhaust gases. Upon continuous exposure to carbon monoxide, the sensitized spot on the 'Detector' will turn darker at a rate dependent upon the concentration of carbon monoxide and humidity of the surrounding atmosphere. The water vapor present in the atmosphere retards 'Detector' reaction to carbon monoxide, particularly under the extended exposure periods required to indicate low concentrations. The consistency of response when the 'Detector' was exposed to carbon monoxide was excellent under a given set of conditions. Regeneration and hence, reuse of the 'Detector' following reaction to carbon monoxide was limited by critical time periods of exposure and/or critical intensities of reaction. Continuous exposure of the 'Detector' to traces of carbon monoxide will result in overexposure and loss of effectiveness within one to five hours time. The 'Detector' will provide effective monitoring in the cabin for periods up to 30 days, provided it does not come in contact with traces of carbon monoxide on a prolonged basis. Although the 'Detector' cannot be used to measure exact concentrations of carbon monoxide, it may be utilized to estimate the presence of SAFE, MARGINAL or DANGEROUS concentrations when used in conjunction with the instruction card incorporating a color scale developed from the results of testing reported herein. The sensitivity of the 'NO-CO' Indicator was not adequate for use of this indicator in general aviation aircraft. (Author)

AD-641 967 **Field 13L**
CFSTI Prices: HC$1.60 MF$0.50
Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF MEETING, FIRE PREVENTION ACTIVITIES, HELPS AND IDEAS.
19 Jul 62, 18p

Descriptors: (*Fire safety, Symposia), Reports.

Topics presented: Some examples of effective fire prevention activities and available promotional helps; How to get the most out of your fire safety contest entry.

AD-641 968 **Field 13L**
CFSTI Prices: HC$2.60 MF$0.50
Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF ANNUAL MEETING, MARCH 8, 1961.
8 Mar 61, 30p

Descriptors: (*Fire safety, Symposia), Reports, Nuclear weapons, Fires, Law.

Topics presented: 'The federal employees' Compensation Act, with amendments, as it applies to fire deaths and injuries'; 'Atomic weapons and fire'; 'An analysis of Ordnance Corps fire loss experience for propellant (explosives) manufacturing.

AD-641 969 **Field 13L**
CFSTI Prices: HC$3.60 MF$0.50
Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL MINUTES OF ANNUAL MEETING, FEBRUARY 21, 1962.
21 Feb 62, 34p

Descriptors: (*Fire safety, Symposia), Reports, Costs, Buildings.

Topics presented: 'Fire prevention and protection within the Department of the Army'; 'The costs, confusion and stultifying effects of building requirements resulting from inadequate knowledge of fire safety and fire protection needs.'

AD-641 970 **Field 13L**
CFSTI Prices: HC$2.00 MF$0.50
Federal Fire Council, Washington, D. C.
FEDERAL FIRE COUNCIL; MINUTES OF MEETING DECEMBER 15, 1965. HIGH EXPANSION FOAM FOR FIRE SUPPRESSION.
15 Dec 65, 38p

Descriptors: (*Fire safety, Symposia), Reports, Foams, Fire extinguishers.

Topics presented: High expansion foam and some of its applications for fire suppression; Federal supply service and what it means to federal fire safety personnel.

PB-173 412 **Field 13L**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles. Inst. of Transportation and Traffic Engineering.
EXPLORATORY WORK ON THE PROBLEM OF REDUCED VISIBILITY.
Final rept.,
by Harry W. Case, and Slade Hulbert. Jun 66, 12p
RR-47
Prepared in cooperation with Dept. of Comm., Bureau of Public Roads and Calif. Div. of Highways. Rept. on Item B-1-22 of Part 2 Research of Federal Work Program HPR-1 (3).

Descriptors: (*California, Research program administration), (*Traffic, Accidents), (*Accidents, Visibility), Simulation, Auditory acuity, Auditory signals, Visual acuity, Visual signals, Radio communication systems, Fog, Passenger vehicles.

Identifiers: Traffic engineering.

As part of a large statewide study of the effects of reduced visibility on traffic accidents, the Advisory Committee for the study in January 1965 voted approval for exploratory work to be conducted in the UCLA Driving Simulator Laboratory in an attempt to determine the feasibility of using the simulation laboratory to conduct research into the four general areas into which the overall study had been divided. The objective of the overall study is to determine means of giving advance warning to drivers of the need to exercise greater alertness and caution during periods of reduced visibility. (Author)

AD-641 361 **See Field 17A**

AD-641 480 **See Field 18H**

AD-641 495 **See Field 14D**

EGG-1183-1210 **See Field 18I**

NBS-TN-295 **See Field 14B**

13M. STRUCTURAL ENGINEERING

AD-484 442 **Field 13M, 11I**
CFSTI Prices: HC$4.00 MF$0.75
National Cash Register Co., Dayton, Ohio.
CHEMICAL RIGIDIZATION OF EXPANDABLE STRUCTURES.
Final technical documentary rept., Apr 65-Mar 66,
by J. F. Hanny, J. W. Jones, L. R. Lankston, and J. C. Scott. May 66, 112p
Contract AF 33(615)-2684
AFAPL-TR-66-53

Descriptors: (*Expandable structures, Solar collectors), (*Plastics, Expandable structures), Isocyanate plastics, Expanded plastics, Catalysts, Polymerization, Free radicals, Vinyl plastics, Storage, Life expectancy, Effectiveness, Stability, Vacuum, Polyester plastics, Adhesives, Stresses, Composite materials, Thermal conductivity, Aluminum, Silicones, Asbestos, Mirrors, Surfaces.

Identifiers: Mylar.

The objective of the program was to develop a chemical rigidization process that could be activated by an on-command mechanism and be capable of rigidizing expandable solar collectors in a simu-

lated aerospace environment. Six two-foot and three ten-foot diameter solar collectors were fabricated and rigidized in the high vacuum facilities at Wright-Patterson AFB, Ohio and were delivered to the Air Force. A 'fail-safe' chemical rigidization system was developed that could be incorporated in a preformed, flexible, polyurethane foam and rigidized by an on-command polymerization initiation. The initiation is accomplished by the introduction of a catalyst which is stored in either microcapsules or an aerosol container. Release is obtained by heat or pressure rupture of the capsules or by spraying the catalyst from the aerosol container. The rigidization reaction, a free-radical polymerization, is a self-propagating reaction, once initiated, in which the rigidization rate can be controlled. Rigidization times for ten foot diameter collectors have been varied from fifteen minutes to two hours. The chemical system, a vinyl-type monomer, has exhibited a sustained shelf life, under ambient conditions, of approximately eight months without premature curing or adverse effects on the total system. (Author)

AD-61 585 **Field 13M**
CFSTI Price: HC$2.60
Forest Products Lab., Madison, Wis.
STRESSES INDUCED IN A SANDWICH PANEL BY LOAD APPLIED AT AN INSERT,
by W. G. Youngquist, and Edward W. Kuenzi.
Mar 55, 18p Rept. no. 1845
Contract AF 18 (600)-102

Descriptors: (*Sandwich panels, *Stresses), Loading (Mechanics).

The report presents the results of tests conducted to determine the stresses induced in the core and facings of a flat sandwich panel by a concentrated load applied at an insert. Test stresses are compared with stresses computed by using theoretical analyses previously developed for the bending of a circular sandwich panel under normal load. It is concluded that the theoretical analysis is fairly well confirmed by the tests and therefore may be used to develop proper design criteria for stresses caused by a loaded insert. (Author)

AD-641 701 **Field 13M, 13A**
CFSTI Price: MF$0.75
General American Research Div., General American Transportation Corp., Niles, Ill.
NATURAL VENTILATION TEST OF AN ABOVEGROUND FALLOUT SHELTER IN CHICAGO, ILLINOIS,
by Robert H. Henninger, and Charles A. Madson.
Aug 66, 82p GARD-1268-81
Contract OCD-PS-64-201
Not reproducible by CFSTI standards.

Descriptors: (*Fallout shelters, Ventilation), Tests, Wind, Temperature, Humidity, Illinois, Civil defense systems.

The results are reported on a natural ventilation test of a corridor-type shelter located in Chicago. The effective temperature of this shelter when occupied at a density of 10 square feet per person will not exceed 83F for more than seven days during an average year. This interim report describes environmental tests performed in a specific shelter. The discussion of the results is preliminary and should not be used as the basis for general conclusions. A subsequent final report will include a comparative evaluation of data from subsequent tests having a variety of configurations and locations. (Author)

AD-641 965 **Field 13M, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass.
EXPERIMENTAL STUDY OF THIN CYLINDRICAL SHELLS UNDER LOCAL AXIAL LOADINGS.
Technical rept.,
by Miloslav Benicek. Aug 66, 20p AMRA-TR-66-22
Proj. DA-1C024401A349
Task 36723

Descriptors: (*Structural shells, *Stresses), Cylindrical bodies, Loading (Mechanics), Elastic shells, Load distribution, Fastenings.

A thin cylindrical shell was subjected to local axial loads. These loads were transferred to the shell through uniformly spaced pads mounted inside the cylinder. The stress distribution in the vicinity of these pads was determined experimentally, and the results were then compared with theoretical findings. Parameters examined included the number and size of pads and the eccentricity of the loads applied to the pads with respect to the middle surface of the cylindrical skin. (Author)

PB-173 406 **Field 13M**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Dept. of Civil Engineering.
BEHAVIOR OF CONTINUOUS PRESTRESSED CONCRETE BEAMS.
Cooperative highway research program,
by Neil M. Hawkins, Mete A. Sozen, and Chester P. Siess. Jul 66, 37p Ser-62
Prepared in cooperation with The State of Illinois, Div. of Highways and Department of Commerce, Bureau of Public Roads. Pub. in proceedings of the International Symposium on Flexural Mechanics of Reinforced Concrete, American Society of Civil Engineers, 1965.

Descriptors: (*Illinois, Civil engineering), (*Bridges, Reinforced concrete), Beams (Structural), Manufacturing methods, Experimental data, Deflection, Strain (Mechanics), Defects (Materials), Deformation, Shear stresses, Moments.

Identifiers: Prestressed concrete.

The results of 22 tests of two-span continuous prestressed concrete beams are described and analyzed. The pretensioned beams were loaded to failure with concentrated, stationary loads placed at the middle of each span. The variables in the tests were: Shape of cross section, concrete strength, amount of longitudinal reinforcement, effective depth, and web reinforcement. The behavior of the beams is described in terms of deflections, strains, and crack patterns. The characteristic features of failures under the primary influence of shear and of flexure are distinguished. The requirements for moment redistribution are discussed. The phenomenon of inclined tension cracking, of critical importance in moment redistribution, is studied quantitatively. The effect of web reinforcement in compensating for the influence of inclined cracking is evaluated. (Author)

PB-173 475 **Field 13M, 11L**
CFSTI Prices: HC$2.00 MF$0.50
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Forest Products.
THE STRENGTH AND STIFFNESS OF NAILED JOINTS UNDER SHORT-DURATION LOADING.
Technical paper,
by J. J. Mack. 16 Feb 66, 27p TP-40

Descriptors: (*Joints, Mechanical properties), (*Wood, Joints), Tensile properties, Loading (Mechanics), Mathematical prediction, Equations, Mechanical fasteners, Australia.

An empirical formula was developed for predicting the load-displacement curve for a nailed timber joint under short-duration loading, up to a displacement of about 0.14 in. Simple factors modify the basic expression for other variables such as species, nail diameter, nail type, and moisture content. (Author)

PB-173 495 **Field 13M, 13C**
CFSTI Prices: HC$1.60 MF$0.50
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
BEHAVIOR OF PRESTRESSED CONCRETE BRIDGE MEMBERS. PORTLAND CEMENT CONCRETE - PRESTRESSED CONCRETE BRIDGES (LIGHTWEIGHT AGGREGATE).
Progress rept.
Jun 66, 19p

Descriptors: (*Concrete, Bridges), (*Bridges, Beams (Structural)), (*Beams (Structural), Strain (Mechanics)), Shrinkage, Creep, Deflection, Climate, Humidity.

The report discloses that the test beams are behaving favorably with respect to losses, creep and shrinkage, and deflections. The prestress losses in the beams are not excessive and these are approaching their maximum value at a decreasing rate. The camber in the beams has incurred only minor variations during the reporting period and data indicates that the deflections are tending to be constant.

AD-450 669 See Field 20K

AD-641 304 See Field 10B

AD-641 408 See Field 13H

AD-641 482 See Field 8L

AD-641 645 See Field 15C

AD-641 646 See Field 15C

AD-641 875 See Field 13J

PB-173 421 See Field 13B

PB-173 490 See Field 13B

14A. COST EFFECTIVENESS

AD-469 240 **Field 14A, 15C**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
SOME PROBLEMS IN COST ANALYSIS.
Research paper,
by J. G. Abert. Jun 65, 29p RP-P-186, IDA/HQ65-3735
Contract SD-50
Task SD-T-12

Descriptors: (*Cost effectiveness, Analysis), Weapon systems, Optimization, Management planning, Armed forces procurement, Scheduling, Department of Defense.

The purpose of cost-effectiveness studies is to make comparisons of various alternative future resource commitments. The implementation of each system being considered would result in a future stream of effectiveness (however it is measured) and a future stream of costs. Often the stream of cost and the stream of effectiveness associated with one system have time-phased profiles different from those of another system. It is virtually impossible to make a direct comparison of such systems. There is generally no way to evaluate the worth of future effectiveness as opposed to the worth of present effectiveness. Discounting, however, can be used to make a logical if indirect comparison of the cost streams. Thus, discounting is a tool for determining the present value of cost streams. Discounting should not be used to attempt to account for future uncertainties with regard to weapon system performance. If the future effectiveness of one system is in doubt because of uncertainty about the future effectiveness of the system, it should be done directly as part of the effectiveness calculation and not by using a high discount rate.

AD-641 336 See Field 5A

AD-641 644 See Field 13F

AD-85 471 See Field 15E

14B. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

AD-111 685 **Field 14B**
CFSTI Price: HC$2.60
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
MEASUREMENT OF DIFFERENTIAL PHASE SHIFT,
by Leo Silber. 19 Jul 56, 24p Research rept. RR-489, PIB-419
Contract DA-36-039-sc-56729
Proj. 3-14-03-053, 435F

Descriptors: (*Phase shift, *Waveguides), Phase meters, Errors.

The use of a microwave phase bridge to measure the differential phase shift of a ferrite-loaded waveguide is discussed. The errors arising in such measurements, using the technique of generator-detector interchange and applied magnetic field reversal are evaluated and compared for a typical situation. It is found that the method of field reversal will lead to smaller errors. (Author)

AD-641 388 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
DESCRIPTION AND PERFORMANCE OF A MOLECULAR BEAM CHAMBER USED FOR CRYOPUMPING AND ADSORPTION PUMPING STUDIES,
by R. F. Brown, and J. H. Heald, Jr. Oct 66, 36p
AEDC-TR-66-135
Contract AF 40 (600)-1200
Projs. AF-8951, ARO-SW3417
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Molecular beams, Instrumentation), (*Space simulation chambers, Molecular beams), (*Cryopumping, Molecular beams), (*Vacuum pumps, Molecular beams), Carbon dioxide, Scattering, Performance (Engineering), Modulation, Nozzles, Superaerodynamics.

An aerodynamic molecular beam chamber was constructed and operated. Design criteria, performance data, and space simulation applications are discussed. Cryopumping was utilized to provide the required pumping speed and to reduce the scattering of the beam by the background gas. A maximum beam intensity of 2.0 x 10 to the 20th power CO2 molecules per second per steradian was measured. The beam is now being used to study basic cryopumping phenomena on a microscopic scale and to provide capture coefficient data for immediate application in the design of cryopumping systems for space simulation chambers. (Author)

AD-641 394 **Field 14B, 7D**
CFSTI Prices: HC$3.00 MF$0.50
General Electric Co., Schenectady, N. Y. Research and Development Center.
A TIME-OF-FLIGHT ELECTRON VELOCITY SPECTROMETER.
Final technical rept.,
by G. C. Baldwin, and S. I. Friedman. 1 Oct 66, 54p
Contract Nonr-3942 (00), ARPA Order-125

Descriptors: (*Electron beams, *Spectroscopy), Gases, Molecules, Electron bombardment, Instrumentation, Velocity, Helium, Argon, Spectrum analyzers.

A velocity selector is described which is designed for measurement of the total collision cross section of electrons in the energy region below one volt. The system determines the distributions of times of flight of single electrons over a measured path at selected pressures of a specimen gas. The electrons are generated by repetitive illumination of a photo-emitter by a spark gap, pass over a shielded drift path, enter an accelerating field, and impinge on an electron multiplier. Electronic equipment and data reduction for analysis of time-of-flight and amplitude distributions of electron counts are described; data illustrative of performance are presented, including typical transmission measurements in helium and argon which extend to 100 millivolts. Applications and extensions of the technique are discussed. (Author)

AD-641 714 **Field 14B, 20D**
Not available from CFSTI.
Vanderbilt Univ., Nashville, Tenn. Dept. of Physics.
MEASUREMENTS OF A PRECURSOR ELECTRON FRONT.
Revised ed.,
by J. P. Barach, and J. A. Sivinski. 26 Apr 65, 6p
Grants AF-AFOSR-287-64, AF-AFOSR-287-63
Proj. AF-9767
Task 976703
AFOSR-66-1257
Revision of manuscript submitted 24 Jun 65.
Availability: Published in The Physics of Fluids v8 n12 p2158-61 Dec 1965.

Descriptors: (*Shock tubes, *Electrons), Shock waves, Velocity, Conductivity, Gases, Performance (Engineering), Electric arcs.

A precursor electron front of a few kiloamperes is induced ahead of the shock flow in an electric shock tube. Velocity measurements show the electron front has a constant number density of 2 x 10 to the 13th power/cc and a velocity proportional to gas conductivity. This front is a field-driven wave and heats the gas so the subsequent shock velocity is about doubled. (Author)

AD-641 720 **Field 14B, 13H, 20A**
CFSTI Prices: HC$2.00 MF$0.50
Frankford Arsenal, Philadelphia, Pa. Fire Control Development and Engineering Labs.
THE ACOUSTIC ANALYSIS OF MATERIALS IN DYNAMIC APPLICATIONS,
by Thomas J. Downing. Sep 66, 36p
FA-M67-6-1

Descriptors: (*Non-destructive testing, Sound signals), Malfunctions, Acoustic equipment, Sound, Analysis, Materials, Vibration.

The Sound Spectrograph, which plots a pattern showing signal energy level variation in both frequency and time, was utilized as the primary analysis equipment during this period. To produce a meaningful pattern, magnetic tape slow-down methods and special signal handling electronics were employed for spectrogram axis scale control and time-displacement referencing. Spectrographic patterns were made for comparative analyses of proper and defective (tooth missing) gear train operation. Significantly different patterns were obtained demonstrating that effects hidden in the waveform become very evident in the pattern. Sound Spectrography is exploited fully in the analysis of system characteristics where either fixed excitation is operated on by a time-varying transfer function, or controlled excitation having time-varying spectral content is applied to a fixed transfer function. The former class includes all rotational and reciprocating equipment and equipment powered by periodic excitation. The latter class includes all passive (no moving parts) devices excited by programmed forcing functions. (Author)

AD-641 907 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Frequency Engineering Labs., Farmingdale, N. J.
DEVELOPMENT OF SIGNAL GENERATOR AN/URM-123 ( ).
Quarterly progress rept. no. 5, 1 Jul-31 Oct 64,
by Robert M. Hibbett. Oct 66, 11p
Contract DA-36-039-AMC-03314 (E)
Proj. DA-5656-12-865
Task 5656-12-865-02-14
ECOM-03314-5

Descriptors: (*Signal generators, Frequency modulation), S band, Test equipment (Electronics), Power supplies, Klystrons, Radiofrequency generators, Standing wave ratios, Oscillators.

Identifiers: AN/URM-123.

Fabrication and assembly of one prototype model was completed and testing started. Transit cases were ordered. Major effort was devoted to development and testing of variable frequency oscillator in AFC system. A source of instability was present but the problem was solved after consultation with transistor vendors. The power supply was completed, tested, revised as necessary, and retested satisfactorily. Effort on the klystron cavity consisted of determining parameters of available tubes and investigating VSWR as a function of frequency in the output probes. Unsatisfactory VSWR in the probes was corrected after analysis by time domain reflectometry. Other tests and design changes were performed on several parts of the equipment system. (Author)

AD-641 927 **Field 14B, 13A**
Not available from CFSTI.
Defence Chemical Biological and Radiation Labs., Ottawa (Ontario).
A SUBSTANDARD LIGHT SOURCE OF VERY LOW INTENSITY,
by R. A. Facey. 10 May 66, 2p DCBRL-TN-66-17
Availability: Published in Journal of Scientific Instruments v43 p658-9 Sep 1966.

Descriptors: (*Lighting equipment, Standards), Radioactive isotopes, Carbon, Plastics, Luminescence, Intensity, Canada.

Preparation of light sources of clear scintillating plastic containing carbon-14 is described, the radioactive hazard being small. The sources, which have a luminous intensity of 2 X to the -11th power candle per cc, have a long-term stability of the order of years and a very small temperature coefficient. (Author)

AD-641 986 **Field 14B, 7C, 7D, 9B K**
CFSTI Prices: HC$3.00 MF$0.75
Frank J. Seiler Research Lab., Air Force Academy, Colo.
THE FRANK J. SEILER RESEARCH LABORATORY
Jul 66, 55p

Descriptors: (*Laboratories, Reviews), (*Air Force research, Reviews), Computers, Systems engineering, Programming (Computers), Optimization, Control systems, Fluid mechanics, Physical chemistry, Organic compounds, Reports, Scientific personnel.

Topics include: introduction to the mission, background and accomplishments of the Frank J. Seiler Research Laboratory at the United States Air Force Academy; publications and presentations during FY '66; current research projects; bibliographies of staff members. Research is being carried out in the following general areas: system optimization, programming and control; fluid dynamics; physical and organic chemistry.

AD-88 698 **Field 14B, 20A**
CFSTI Price: HC$42.60
Wilmotte (Raymond M.), Inc., Kendal, Fla.
SUMMARY AND RECOMMENDATIONS. VOLUME A. TEXT,

by R. Wilmotte. 20 Dec 55, 430p Rept. no. 1015
Contract AF 30 (602)-1361

Descriptors: (*Spectrum analyzers, Design), (*Ultrasonic radiation, Intensity).

The basic problems of the present study include the analysis of techniques for: (a) Translating a band of radio waves into a band of ultrasonic waves of requisite intensity in a suitable medium; (b) Controlling the path of the ultrasonic waves as a function of frequency, and with adequate frequency resolution and bandwidth, as for example, by diffraction of the waves of by other techniques; (c) Rendering visible the paths of the waves, whereby the frequencies of the waves are indicated; (d) Measuring directly the frequency of ultrasonic waves by a device which provides a direct visible indication of the length of the waves; (e) Providing specialized types of ultrasonic displays, such as displays having permanence characteristics of specified phosphors; (f) Diffracting light in response to sonic waves, to an extent determined as a function of the sonic wave length.

NBS-TN-295 **Field 14B, 21H, 9E, 13L**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Washington, D. C.
DISCLOSURES ON: A TRANSROTOR ENGINE, HIGH TEMPERATURE PLATINUM RESISTANCE THERMOMETER, DYNAMIC ANALOG CORRELATION SYSTEM, AND COMBINATION METERING AND SAFETY VALVE FOR FILLING SONDE BALLONS WITH HYDROGEN,
by David Robbins, and Alvin J. Englert. 21 Oct 66, 27p
Also available from Superintendent of Documents, GPO, Washington, D. C., 20402 $0.25.

Descriptors: (*Engines + motors, Design), (*Resistance thermometers, Design), (*Correlators, Design), (*Safety valves, *Ballons).

The booklet presents descriptions and drawings of four devices, embodying interesting and unusual solutions to problems frequently encountered in their respective fields: a transrotor engine, a dynamic analog correlation system, a high temperature platinum resistance thermometer, and a combination metering and safety valve for filling sonde balloons with hydrogen. (Author)

NBS-TN-344 **Field 14B**
CFSTI Prices: HC$0.20 MF$0.50
National Bureau of Standards, Boulder, Colo. Radio Standards Lab.
A SENSITIVE RECORDING NMR ULTRASONIC SPECTROMETER,
by Lawrence W. James. 7 Sep 66, 17p
Also available from Superintendent of Documents, GPO, Washington, D. C., 20402 $0.20.

Descriptors: (*Nuclear magnetic resonance, Instrumentation), (*Ultrasonic radiation, Absorption spectrum), Crystal lattices, Nuclear spins, Recording systems, Electroacoustic transducers, Integrators.

Instrumentation is described for automatically obtaining a continuous recording of ultrasonic absorption lines. Ultrasonic power is added to the crystal lattice by a transducer mounted on a single crystal of the sample. The interaction of the ultrasonics with the nuclear spin system is recorded by using a pulse NMR system in conjunction with a boxcar integrator. This technique is more sensitive and provides more easily interpretable results than earlier systems. (Author)

N66-32788 **Field 14B**
CFSTI Prices HC$2.50 MF$0.75
Physics International Co., San Leandro, Calif.
THE DEVELOPMENT OF AN EXPLOSIVELY DRIVEN HYPERVELOCITY GAS GUN FINAL REPORT.
by C. S. Godfrey, and E. T. Moore. 18 Aug 65, 75p NASA-CR-76941, PIFR-132
Contract NASW-978

Descriptors: *Gas gun, *Hypervelocity gun, Acceleration, Conical, Design, Development, Drive, Explosive, Fragment, Gas, Gun, Hypervelocity, Linear, Projectile.

For abstract, see STAR 04 19.

N66-33424 **Field 14B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
VARIABLE DYNAMIC FORCE VECTOR ROCKET TEST APPARATUS.
by J. L. Hudson Jr, M. H. Lucy, and R. L. Swain. 1964, 11p NASA-TM-X-54895
Presented At The 2d Ann. Meeting Of The Icrpc Working Group On Static Testing, Redlands, Calif., 21-23 Oct. 1964

Descriptors: *Dynamic property, *Rocket test station, *Test facility, *Vector, Apparatus, Centrifugal, Characteristics, Design, Dynamic, Environment, Facility, Force, Motor, Performance, Rocket, Station, Test, Variable.

For abstract, see STAR 04 19.

N66-33539 **Field 14B**
CFSTI Prices HC$2.50 MF$0.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AN ORBITING DENSITY MEASURING INSTRUMENT.
by R. L. Chuan, K. W. Rogers, J. B. Wainwright, and D. A. Wallace. 26 May 66, 57p NASA-TM-X-53468

Descriptors: *Density measurement, *Measuring apparatus, *Space density, *Spacecraft electronic equipment, Apparatus, Collector, Cryopumping, Density, Design, Device, Electronic, Equipment, Gas, Measurement, Orbit, Space, Spacecraft, Telemetry.

For abstract, see STAR 04 19.

N66-33771 **Field 14B**
CFSTI Prices HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
RADIATION MEASUREMENT TECHNIQUES.
by W. A. Menard, and G. M. Thomas. 1 Aug 66, 32p NASA-CR-77089, JPL-TR-32-975
Contract NAS7-100

Descriptors: *Electric arc, *Radiation measurement, *Shock tunnel, Arc, Calibration, Carbon, Data, Electric, Gauge, Hypervelocity, Light, Measurement, Radiation, Reduction, Shock, Source, Spectral, Stray, Technique, Total, Tube, Tunnel, Ultraviolet, Wave.

For abstract, see STAR 04 19.

N66-37644 **Field 14B**
CFSTI Prices HC$2.50 MF$0.75
Avco Corp., Wilmington, Mass. Space Systems Div.
A SYSTEM TO MEASURE THE MASS OF A PROJECTILE LAUNCHED FROM AN EXPLODING FOIL GUN FINAL REPORT.
by J. A. Morreal. Jun 66, 80p NASA-CR-66164, L-5344
Contract NAS1-5221

Descriptors: *Ballistics, *Mass, *Measuring apparatus, *Projectile, *Spacecraft design, Armor, Energy, Explosion, Foil, Gun, Kinetic, Micrometeorite, Momentum, Protection, Transfer.

For abstract, see STAR 04 23.

N66-37681 **Field 14B**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
OVERLAY COPY TECHNIQUE TO PROVIDE HIGH-CONTRAST ELECTRON MICROGRAPHS FOR AUTOMATIC METALLOGRAPHIC ANALYSIS.
by W. S. Cremens, L. F. Norris, and J. W. Weeton. Oct 66, 12p NASA-TN-D-3658
Contract 129-03-01-05-22

Descriptors: *Microanalysis, *Microstructure, *Nickel, *Scanning device, Analyzer, Automatic, Ceramic, Contrast, Determination, Dispersion, Distribution, Electron, Film, High, Instrumentation, Metal, Micrography, Multiphase, Overlay, Particle, Size, Specimen, Volume.

For abstract, see STAR 04 23.

N66-37826 **Field 14B**
CFSTI Prices HC$6.00 MF$1.50
National Aeronautics And Space Administration, Washington, D. C.
PROCEEDINGS OF SECOND CONFERENCE ON SOLAR SIMULATION RESEARCH.
1964, 267p NASA-TM-X-56299
Conf. Held At Nasa, Washington, 7-8 Apr. 1964

Descriptors: *Conference, *Solar simulation, *Technology, Apollo spacecraft, Arc, Carbon, Component, Distribution, Earth, Energy, Environment, Facility, Filter, High energy, Interplanetary, Laboratory, Measurement, Monochromator, Radiation, Ranger block iii, Reflector, Research, Satellite, Simulation, Solar, Space, Spacecraft, Spectral, Testing, Thermal.

For abstract, see STAR 04 23.

N66-37905 **Field 14B**
CFSTI Prices HC$3.00 MF$0.75
Rosemount Engineering Co., Minneapolis, Minn.
DEVELOPMENT OF A FAST RESPONSE TEMPERATURE GAGE FOR ROCKET VEHICLE PLUMBING SYSTEMS FINAL REPORT, 24 JUN. 1964 - 24 JUN. 1965.
by T. M. Stickney. 18 Jun 65, 70p NASA-CR-78446, REC-66518A
Contract NAS8-11699

Descriptors: *Plumb bob operation, *Rocket vehicle, *Temperature indicator, Flow, Gas, Gauge, Mounting, Parameter, Property, Sensor, Stem, Superalloy, Thermoelement.

For abstract, see STAR 04 23.

N66-37943 **Field 14B**
CFSTI Prices HC$7.00 MF$2.00
Martin Co., Denver, Colo.
STUDY OF CONTAMINATION SENSORS. VOLUME II - FINAL TECHNICAL REPORT.
by H. V. Anthony, J. G. Drew, E. F. La rue, and J. P. Mc donald. Apr 66, 357p NASA CR-78438, CR-66-18/VOL. II/
Contract NAS10-2693

Descriptors: *Contamination, *Monitor, *Particle counter, *Sampling device, *Sensor, Automatic, Criterion, Design, Equipment, Facility, Fluid, Impurity, Launch.

For abstract, see STAR 04 23.

N66-37944 **Field 14B**
CFSTI Prices HC$2.00 MF$0.50
Martin Co., Denver, Colo.
STUDY OF CONTAMINATION SENSORS. VOLUME I - EXECUTIVE SUMMARY REPORT.

by H. V. Anthony, J. G. Drew, E. F. La rue, and J. P. Mc donald. Apr 66, 31p NASA CR-78437, CR-66-18/VOL. I/
Contract NAS10-2693

Descriptors: *Contamination, *Monitor, *Particle counter, *Sampling device, *Sensor, Automatic, Criterion, Design, Facility, Fluid, Impurity, Launch, Purity, Recorder.

For abstract, see STAR 04 23.

N66-38017 **Field 14B**
CFSTI Prices HC$6.00 MF$1.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
HISTORY OF THE GEORGE C. MARSHALL SPACE FLIGHT CENTER, JULY 1 THROUGH DECEMBER 31, 1964, VOLUME ONE NINTH SEMIANNUAL HISTORY.
by D. S. Akens, A. R. Jarrell, and L. L. Jones. 1966, 246p NASA-TM-X-57941, MHM-10, VOL. 1

Descriptors: *Nasa program, *Saturn launch vehicle, Chronology, Development, Event, Exploration, Facility, Ground, Instrumentation, Management, Payload, Saturn i launch vehicle, Saturn ib launch vehicle, Saturn v launch vehicle, Space, Support.

For abstract, see STAR 04 23.

N66-38106 **Field 14B**
CFSTI Prices HC$2.50 MF$0.50
Consolidated Controls Corp., Bethel, Conn.
PRESSURE MEASURING SYSTEMS FOR FOR CLOSED CYCLE LIQUID METAL FACILITIES NINTH QUARTERLY REPORT, MAR. 1 - MAY 31, 1966.
by A. J. Cassano. 1 Aug 66, 57p NASA-CR-72055, CCC-564
Contract NAS3-4170

Descriptors: *Liquid metal, *Pressure transducer, *Thermionic diode, Close, Cycle, Design, Measurement, Pressure, Program, Test.

For abstract, see STAR 04 23.

N66-38146 **Field 14B**
CFSTI Prices HC$2.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Space Power And Propulsion Section.
POTASSIUM CORROSION TEST LOOP DEVELOPMENT QUARTERLY PROGRESS REPORT NO. 10, 15 OCT. 1965 - 15 JAN. 1966.
by E. E. Hoffman. 9 Jun 66, 41p NASA-CR-54990
Contract NAS3-2547

Descriptors: *Corrosion test, *Refractory alloy, *Test facility, Boiling, Condensation, Electric, Endurance, Environment, Life, Loop, Potassium, Power, Prototype, Simulation, Space, System.

For abstract, see STAR 04 23.

N66-38361 **Field 14B**
CFSTI Prices HC$2.00 MF$0.50
Commonwealth Scientific And Industrial Research Organization, Sydney (Australia). Radiophysics Lab.
AN INSTRUMENT FOR THE RAPID MEASUREMENT OF SURFACE DEFORMATIONS OF A 210-FT RADIO TELESCOPE.
by H. C. Minnett, and M. J. Puttock. Sep 65, 48p NASA-CR-68653, RPP-966
Grant NSG-240-62

Descriptors: *Instrument, *Surface diffusion effect, Angle, Automatic, Axis, Camera, Deflection, Deformation, Design, Dish, Feed, Gravitational, Inclination, Measurement, Position, Radio telescope, Shape, Spindle, Survey, Theodolite, Vertical, Zenith.

For abstract, see STAR 04 23.

N66-38493 **Field 14B**
CFSTI Prices HC$2.50 MF$0.75
Bendix Corp., Ann Arbor, Mich. Systems Div.
LUNAR SIMULATION MODEL AND OPTICAL STUDIES FOR LUNAR ORBITER SYSTEM SUPPORT.
by H. Graboske, and E. Marsh. Sep 66, 63p NASA-CR-66176, BSR-1362
Contract NAS1-5710

Descriptors: *Lunar surface, *Photometry, *Simulation, *Topography, Calibration, Characteristics, Contour, Lunar orbiter, Map, Mechanical, Model, Optical, Photogrammetry, Slope, Structure, Support, System.

For abstract, see STAR 04 23.

N66-38494 **Field 14B**
CFSTI Prices HC$2.00 MF$0.50
Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME I, PART 1 - LUNAR GRAVITY SIMULATION FACILITY.
by W. Kuehnegger. 1966, 50p NASA-CR-66115, NSL-65-153
Contract NAS1-4449

Descriptors: *Lunar gravitation, *Simulator, Astronaut, Equipment, Facility, Gravity, Instrumentation, Lunar, Simulation, Suspension, System, Test, Training.

For abstract, see STAR 04 23.

N66-38688 **Field 14B**
CFSTI Prices HC$3.00 MF$1.00
Giannini Controls Corp., Duarte, Calif. Control/nucleonics Div.
FEASIBILITY STUDY FOR AN X-RAY BACK-SCATTER FREE AIR DENSITY SENSOR.
by D. B. Hakewessell. 1966, 128p NASA-CR-66148
Contract NAS1-4349

Descriptors: *Atmospheric density, *Backscatter, *Gamma radiation, *Rocket sounding, *X-ray scattering, Density, Detector, High altitude, High energy, Measurement, Nike-apache rocket, Radiation, Source.

For abstract, see STAR 04 23.

N66-38725 **Field 14B**
CFSTI Prices HC$5.00 MF$1.25
General Electric Co., Cincinnati, Ohio. Missile And Space Div.
POTASSIUM CORROSION TEST LOOP DEVELOPMENT - PURIFICATION, ANALYSIS AND HANDLING OF SODIUM AND POTASSIUM TOPICAL REPORT NO. 4.
by L. E. Dotson, and R. B. Hand. 13 Jun 66, 190p NASA-CR-78518, R66SD3012
Contract NAS3-2547

Descriptors: *Corrosion test, *Potassium, *Purification, *Sodium, Alkali, Analysis, Contamination, Corrosion, Distillation, Drawing, Filtration, Handling, Loop, Spectrography, Test.

For abstract, see STAR 04 23.

N66-38747 **Field 14B**
CFSTI Prices HC$2.50 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
VALIDATION OF A RESEARCH SIMULATOR FOR INVESTIGATING JET TRANSPORT HANDLING QUALITIES AND AIRWORTHINESS CRITERIA DURING TAKEOFF.
by C. T. Jackson Jr, and C. T. Snyder. Oct 66, 57p NASA-TN-D-3565

Descriptors: *Airworthiness requirement, *Flight simulator, *Handling quality, *Jet transport, *Takeoff, Computer, Criterion, Data, Equation, Flight, Motion, Opinion, Performance, Pilot, Problem, Program, Research, Scaling, Test, Validity.

For abstract, see STAR 04 23.

N66-38794 **Field 14B**
CFSTI Prices HC$2.00 MF$0.50
Northrop Space Labs., Hawthorne, Calif.
A STUDY OF MAN'S PHYSICAL CAPABILITIES ON THE MOON. VOLUME I, PART 1 - LUNAR GRAVITY SIMULATION FACILITY.
by W. Kuehnegger. 1966, 50p NASA-CR-66115, NSL-65-153, VOL. I, PT. 1
Contract NAS1-4449

Descriptors: *Environment simulation, *Lunar gravitation, *Physical work, Capability, Earth, Energy, Facility, Instrument, Level, Locomotion, Man, Pack, Rate, Run, Suspension, Treadmill, Walking.

For abstract, see STAR 04 23.

PB-173 339 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
OSCILLOSCOPE PREAMPLIFIER MX-2721, MX-2930A, MX-2930B, 162A, 162B, 162C, HO1-162A, HO2-162A, HO2-162B (HEWLETT-PACKARD) 1804A-2 (HICKOK).
Technical manual instrument calibration procedure VA-01.
1 Oct 66, 26p
NAVWEPS-17-20VA-01

Descriptors: (*Test equipment (Electronics), Calibration), (*Calibration, Preamplifiers), Oscilloscopes, Instruction manuals.

PB-173 395 **Field 14B, 7D**
CFSTI Prices: HC$4.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDES D'ELEMENTS UTILISES EN INTERFEROMETRIE HERTZIENNE (ONDES) MILLIMETRIQUES). MESURE DE LA PERMITTIVITE DE DIELECTRIQUE LIQUIDE (Studies of Elements Used in Hertzian Interferometry (Millimetric Waves). Measurement of the Permittivity of a Liquid Dielectric).
Doctoral thesis in French,
by Michel Dagai. Dec 64, 102p CEA-R-2993
Text in French; attached summary in English.

Descriptors: (*Interferometers, Extremely high frequency), (*Hydrocarbons, *Dielectric properties), Radio interferometers, Millimeter waves, Microwave equipment, Halogenated hydrocarbons, Benzenes, France.

Identifiers: Octanes, Chloro benzenes.

A study was made of the design of equipment for use in EHF interferometry, with particular attention given to assemblies permitting the measurement of complex dielectric constants of liquids. The dielectric constants of the following liquids were examined: octane from -50C to 70C; monochlorobenzene at 22.8C; octane mixed with 10.8% citral at 22C; benzene at 21C.

PB-173 397 **Field 14B, 18D, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
TABLE DE DEPOUILLEMENT BIP 101 POUR CLICHES DE CHAMBRES A BULLES (Scanning Table BIP 101 for Bubble Chamber Pictures),

by Christian Calmels. Sep 66, 13p CEA-R-3045
Text in French; attached summary in English.

Descriptors: (*Ionization trails, *Scanning), Bubble chambers, Particle trajectories, Photographic images, Photographic equipment, Instrumentation, France.

BIP 101 is a new scanning table for bubble chamber pictures, especially aimed at the full scale projection of the CERN 2m hydrogen chamber. The table itself is divided in two half tables, each of them receiving, successively or simultaneously, the projections of 2 of the 4 films. Projectors with film transport are located in the central space between both half tables. Their light is reflected on 2 mirrors fixed at the ceiling. Thus the 4 sides of the table are freely accessible to the scanners. It will be possible to equip later the table with digitizers, allowing pre-measurements of the events for HPD device, or even measurements. (Author)

PB-173 449 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
OSCILLOSCOPE 130A OR 130B (HEWLETT-PACKARD).
Technical manual instrument calibration procedure. VW-01.
1 Oct 66, 24p
NAVAIR-17-20VW-01

Descriptors: (*Test equipment (Electronics), Calibration), (*Calibration, Oscilloscopes), Instruction manuals, Test methods.

PB-173 468 **Field 14B**
CFSTI Prices: HC$1.25 MF$0.50
Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS.
Oct 66, 50p

Descriptors: (*Naval research, Reports), (*Sulfur, Detection), (*Atmosphere, Absorption spectrum), Chemistry, Electricity, Metallurgy, Ceramic materials, Optics, Physics, Color centers, Radar antennas, Sound.

Complete papers: A nuclear method for detecting sulfur in thin films; and absorption in the atmosphere by the oxygen dimer (02)2 complex at 1.06 microns. Summaries are given of research in the following fields: chemistry, electricity, metallurgy and ceramics, optical physics, radio, and sound.

PB-173 480 **Field 14B, 1C**
CFSTI Prices: HC$2.00 MF$0.50
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
AIRCRAFT WEIGHING SCALES MODEL NWP-1 GILMORE INDUSTRIES.
Technical manuel instrument calibration procedure MF-03.
15 Aug 66, 27p
NAVWEPS-17-20MF-03

Descriptors: (*Balances, *Calibration), (*Aircraft, Balances).

The Test Instrument consists of up to five weighing scales, a self-balancing digital indicator, and accessories, and is used to determine the weight and center of gravity of aircraft.

PB-173 485 **Field 14B, 9C, 20N**
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
RADIO FREQUENCY POWER TEST SET AN/USM-96.
Technical manual instrument calibration procedure GP-10.
15 Aug 66, 16p
NAVWEPS-17-20GP-10

Descriptors: (*Test sets, *Calibration), (*Radiofrequency power, Test sets), Instrumentation.

Identifiers: AN/USM-96.

This portable test unit is used to measure the power level of radio frequency output from either continuous-wave, modulated, or pulsed sources. It is designed for measurements at frequencies from 1.0 to 10.0 GHz and at power levels from 100 microwatts to 5 watts.

PB-173 517 **Field 14B, 9C**
CFSTI Prices: HC$3.00 MF$0.65
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
COAXIAL THERMISTOR MOUNTS WITH TYPE N CONNECTORS.
Technical manual instrument calibration procedure 20GD-08.
1 Aug 66, 36p
NAVWEPS-17-20GD-08

Descriptors: (*Electric connectors, Calibration), (*Thermistors, Electric connectors), Coaxial cables, Waveguide couplers, Test equipment (Electronics), Test methods, Instruction manuals.

Identifiers: Coaxial connectors.

This procedure describes the calibration of thermistor mounts with type N coaxial fittings. The procedure describes calibration at frequencies of 0.01, 0.03, 0.10, 0.40, 1.0, 3.0, 9.0, and 9.8 GHz.

AD-458 414 **See Field 11H**

AD-480 791 **See Field 7D**

AD-641 482 **See Field 8L**

AD-641 484 **See Field 20D**

AD-641 765 **See Field 18H**

AD-641 842 **See Field 20D**

AD-641 904 **See Field 11L**

AD-641 910 **See Field 6A**

AD-642 007 **See Field 6M**

PB-173 384 **See Field 6R**

PB-173 450 **See Field 9C**

PB-173 496 **See Field 8M**

PB-173 500 **See Field 9C**

PB-173 502 **See Field 9C**

PB-173 503 **See Field 9C**

PB-173 504 **See Field 9C**

14C. RECORDING DEVICES

AD-450 169 **Field 14C**
CFSTI Price: HC$3.60
Naval Applied Science Lab., Brooklyn, N. Y.
INVESTIGATION OF MAGNETIC TAPE WEAR CHARACTERISTICS - DEVELOPMENT OF A TAPE WEAR SIMULATOR.
Final rept.,
by J. Scheiman, and R. Schwartz. 16 Oct 64, 22p
Projs. 5942-9, SF007-06-02
Task 4916

Descriptors: (*Magnetic tape, Wear resistance), Performance test, Simulators, Reliability, Degradation, Life expectancy.

Identifiers: 1964.

This report covers the design of magnetic tape wear simulators for high resolution (wideband) tape and general instrumentation type tape. Validation was performed by comparing tape wear on each simulator to tape wear on tape transports of each type (wideband and general purpose). Tape wear on the simulators as well as the transports was judged by the degradation in the dropout characteristic. Recommendations were presented for specification tape wear requirements based upon simulator use. (Author)

N66-38780 **See Field 20F**

14D. RELIABILITY

AD-641 495 **Field 14D, 13L, 16D**
CFSTI Prices: HC$1.60 MF$0.50
Picatinny Arsenal, Dover, N. J. Quality Assurance Div.
SAFETY MARGINS AND ULTIMATE RELIABILITY,
by A. Bulfinch. 25 Nov 60, 16p
ORDBB-NR-106

Descriptors: (*Guided missile components, Reliability), (*Safety, Reliability), (*Reliability, Systems engineering), Probability, Test methods.

The purpose of the paper is to do the following: (1) Describe some of the complexities and limitations of missile component reliability determinations. (2) Emphasize the fact that each type of component has many reliability values simultaneously. (3) Show the relation between safety margins and reliability. (4) Define ultimate reliability. (5) Propose practical procedures for determining numerical values for reliabilities of missile components. References are given for the fundamentals of design of experiment techniques and for applications of the proposed approach to reliability determinations. (Author)

N66-38714 **Field 14D**
CFSTI Prices HC$1.00 MF$0.50
Rand Corp., Santa Monica, Calif.
ADAPTIVE AGE REPLACEMENT.
by B. Fox. Sep 66, 24p NASA-CR-78463, RM-5009-NASA
Contract NASR-21/11/

Descriptors: *Aging, *Bayesian statistics, *Dynamic programming, Adaptive, Approach, Asymptote, Cost, Dynamic, Parameter, Policy, Programming, Replacement, Set, Statistics, Treatment.

For abstract, see STAR 04 23.

AD-449 419 **See Field 1D**

AD-641 858 **See Field 9A**

AD-85 471 **See Field 15E**

14E. REPROGRAPHY

AD-478 089 **Field 14E, 9B, 5G, 15D**
CFSTI Prices: HC$1.00 MF$0.50
Pittsburgh Univ., Washington, D. C. Research Staff.
DEVELOPMENT OF CHINESE IDEOGRAPHIC COMPOSING MACHINE.
Technical information rept.
Jan 66, 21p TIR-12.3.1.1 (1)
Contract DA-49-186-AMC-214 (D)
Proj. DA-1M643324D588
Task 1M643324D588-06
AD-447 613-Superseded

Descriptors: (*Chinese language, *Printing), (*Input-output devices, Printing), Military publications, Propaganda, Electrooptical pho-

tography, Electronic equipment, Vocabulary, Portable, Graphics.

Identifiers: Ideograms, Photocomposition.

The report details development of a photocomposing machine for Chinese ideographic characters for the preparation of printed propaganda, orientation, and other materials. The development was found feasible in 1954 when studies revealed constants in the composition of Chinese ideographs. Using advanced concepts of electrical circuitry, video, and photography, a practical electronic ideographic photocomposing machine was developed. An early prototype had a vocabulary of 2,500 ideographs and the machine's capacity could be expanded to 10,000 ideographs. An improved version of this machine has a vocabulary of 8,000 ideographs with spaces for 2,000 more. It operates at 600 strokes per minute. Provision is made for kinescope verification of characters, precomposed ideographs (entities), and ambiguous characters. The machine is 78 inches long, 29 inches deep, and 60 inches high. It weighs 2,400 pounds, is housed in a standard S-280 electrical equipment shelter, and is transportable by truck or helicopter. (Author)

AD-641 878 **Field 14E**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Test Station, China Lake, Calif.
UNDERWATER RANGE-GATED PHOTOGRAPHY,
by Paul J. Heckman, Jr. Oct 66, 32p NOTS-TP-4182

Descriptors: (*Underwater photography, Range gating), Lasers, Light transmission, Underwater light, Opdar, Backscattering, Photographic techniques.

The applicability of underwater optical range gating, designed to extend the maximum range of underwater photography, was demonstrated in a series of experiments. With black tape on Scotchlite as the target, comparison photographs of gated and non-gated exposures showed promise in the clarity of the gated pictures, an improvement attributable to the elimination of most of the backscattered light. The apparatus is described and a sample of the data obtained at various target distances is presented and discussed. An expression for the energy density available at the receiver using the gating technique and a correlation of this expression with the experimental data are also presented. (Author)

N66-38492 **Field 14E**
CFSTI Prices HC$3.25 MF$1.00
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT SLOPE - STUDY OF LUNAR ORBITER PHOTOGRAPHIC EVALUATION FINAL REPORT.
by T. M. Holladay, R. E. Kinzly, and P. G. Roetling. 20 May 66, 167p NASA-CR-66158, CAL-VS-2182-D-2
Contract NAS1-5800

Descriptors: *Data reduction, *Lunar orbiter, *Photograph interpretation, *Topography, Criterion, Detection, Evaluation, Measurement, Method, Parameter, Performance, Photograph, Project, Quality, Ranger project, Slope, System.

For abstract, see STAR 04 23.

AD-641 326 **See Field 5B**

AD-641 339 **See Field 5A**

AD-641 650 **See Field 3A**

AD-641 984 **See Field 20K**

15B. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL WARFARE

AD-481 660 **Field 15B**
CFSTI Prices: HC$1.00 MF$0.50
Edgewood Arsenal, Md. Medical Research Lab.
COLOR NAMES AND RESPONSE CRITERIA FOR THE E56 CHEMICAL DETECTOR KIT.
Technical rept., Sep-Dec 65,
by John W. Lewis. Apr 66, 22p
Proj. DA-1C622401A097
EATR-4000

Descriptors: (*Toxic agent alarms, Human engineering), Colors, Perception (Psychology), Standardization, Colorimetric analysis, Chemical warfare agents, Samplers.

Identifiers: E56 Detector kit.

A study was done, utilizing medical research volunteers to determine the consistency of color naming between the volunteers and trained chemists. These results were obtained: (1) A single color name is inadequately to convey unequivocal meaning to a group of people, (2) A range of color name responses increases observer agreement, (3) Since chemical changes produce variations in color reactions to those changes, a large number of names would be necessary to give sufficient information to enable accurate judgements regarding positive or negative chemical reactions, and (4) The simplest method of providing the most available information about the color criterion would be to print a color continuum or color bar of the ranges to be encountered. This would obviate the necessity of color naming. It would require the matching up of standard color chips with the names obtained by a group of observers comparable to the test group. These chips could then be arranged into an appropriate continuum. (Author)

15C. DEFENSE

AD-641 448 **Field 15C, 5E, 1C**
CFSTI Prices: HC$7.60 MF$0.75
New York Univ., N. Y.
LAYOUT OF THE COMBAT INFORMATION CENTER IN THE PO-2W AIRCRAFT.
Technical rept.,
by Joseph G. Adiletta. Apr 51, 57p
Contract N6onr-279 (03)
Projs. NR-784-006, SPECDEVCEN-20-F-4
SPECDEVCEN-279-3-5

Descriptors: (*Combat information centers, Airborne), Human engineering, Electronic aircraft, Aircraft cabins, Design, Display systems, Flight crews, Maintenance, Officer personnel.

Identifiers: C-121 aircraft.

The report represents the results of a study conducted to find the optimal layout of electronic equipment for the airborne Combat Information Center for the PO-2W aircraft. It was found that, in arranging equipment in an airborne CIC, there were four levels of importance into which the various considerations fell: (1) Availability of central displays; (2) Observation of the activities of certain personnel by the CIC Officer, Ability of the CIC Officer to talk to certain personnel without phones, Flight maintenance facility; (3) Ease of personnel traffic, Crew comfort; and (4) Ground maintenance facility. (Author)

AD-641 455 **Field 15C, 5E, 1C**
CFSTI Prices: HC$3.00 MF$0.75
New York Univ., N. Y.
EXPERIMENTAL METHODS OF EVALUATING A SYSTEM: THE AIRBORNE C.I.C.
Technical rept.,
by Robert L. Chapman. Jul 51, 95p
Contract N6onr-279 (03)
Projs. NR-784-006, SPECDEVCEN-20-F-4
SPECDEVCEN-279-3-7

Descriptors: (*Combat information centers, Airborne), Human engineering, Performance (Engineering), Systems engineering, Flight crews, Electronic aircraft, Aircraft cabins.

Identifiers: C-121 aircraft, Evaluation.

The report concerns the evaluation, from the human engineering point of view, of an airborne Combat Information Center (Cadillac III). The purpose of the report is to describe the nature of the research problem by listing the variables which possibly influence the system's performance, to state some principles for systems research which have been evolved, and to report certain tentative results. (Author)

AD-641 645 **Field 15C, 13M, 5K**
CFSTI Prices: HC$7.00 MF$1.75
Iowa Agricultural and Home Economics Experiment Station, Ames. Dept. of Sociology and Anthropology.
ADOPTION OF PUBLIC FALLOUT SHELTERS, A 1964 NATIONAL STUDY.
Final rept.,
by Gerald E. Klonglan, George M. Beal, and Joe M. Bohlen. 1966, 349p Rural Sociology-49
Contract OCD-PS-65-9
Task 4811-E
See also AD-641 646.

Descriptors: (*Fallout shelters, Public opinion), Civil defense systems, Attitudes, Perception, Analysis, Nuclear warfare.

A model of the adoption process is used to analyze the public's progress in adopting the idea of using public fallout shelters in the event of nuclear attack. The analysis is based on findings from the 1964 OCD National Survey of 1464 respondents. Respondents are assigned to one of five adoption stages; 44.7% of the respondents were unaware of the existence of public fallout shelters (Unaware Stage); 10.2% were aware of public fallout shelters but had no additional information about them (Aware Stage); 16.6% were aware of and had additional information about public fallout shelters but had not thought about using them (Information Stage); 10.2% were aware of, had additional information, and had thought about using public fallout shelters but had not decided to go to a public fallout shelter (Evaluation Stage); 18.2% were aware of, had additional information, had thought about using and had decided to go to a public fallout shelter in the event of nuclear attack (Adoption Stage). The relationships between selected demographic and attitude variables and stage of adoption of public fallout shelters are analyzed. (Author)

AD-641 646 **Field 15C, 13M, 5K**
CFSTI Prices: HC$2.00 MF$0.50
Iowa Agricultural and Home Economics Experiment Station, Ames. Dept. of Sociology and Anthropology.
ADOPTION OF PUBLIC FALLOUT SHELTERS, A 1964 NATIONAL STUDY.
Summary of the final rept.,
by Gerald E. Klonglan, George M. Beal, and Joe M. Bohlen. 1966, 34p Rural Sociology-49S
Contract OCD-PS-65-9
Task 4811-E
See also AD-641 645.

Descriptors: (*Fallout shelters, Public opinion), Civil defense systems, Attitudes, Perception, Analysis, Nuclear warfare.

A model of the adoption process is used to analyze the public's progress in adopting the idea of using public fallout shelters in the event of nuclear attack. The analysis is based on findings from the 1964 OCD National Survey of 1464 respondents. Respondents are assigned to one of five adoption stages; 44.7% of the respondents were unaware of the existence of public fallout shelters (Unaware

Stage); 10.2% were aware of public fallout shelters but had no additional information about them (Aware Stage); 16.6% were aware of and had additional information about public fallout shelters but had not thought about using them (Information Stage); 10.2% were aware of, had additional information, and had thought about using public fallout shelters but had not decided to go to a public fallout shelter (Evaluation Stage); 18.2% were aware of, had additional information, had thought about using and had decided to go to a public fallout shelter in the event of nuclear attack (Adoption Stage). The relationships between selected demographic and attitude variables and stage of adoption of public fallout shelters are analyzed. (Author)

AD-469 240 See Field 14A

AD-641 446 See Field 17I

AD-641 452 See Field 17I

AD-641 480 See Field 18H

AD-641 855 See Field 5C

AD-641 989 See Field 5J

15D. INTELLIGENCE

AD-641 327 Field 15D
CFSTI Prices: HC$2.00 MF$0.50
Army Personnel Research Office, Washington, D. C.
GENERATING RANDOM INFORMATION FOR EXPERIMENTAL DECISION PROBLEMS.
Technical research note,
by Robert F. Boldt. Jun 66, 31p TRN-171
Proj. DA-2J024701A723

Descriptors: (*Military intelligence, Decision making), (*Decision making, Mathematical models), Probability, Enemy personnel, Military tactics, Deployment, Logistics, Statistical analysis, Equations, Simulation, Feasibility studies, Manpower studies.

The study reports on various methods which have been used to generate information through random processes which, to some degree, simulate randomness and inconsistency of actual combat information. Where appropriate, lines of future development are suggested which would lead to valuable additions to this growing body of technique. Two processes are described. The first deals with generating information about the probable structure of enemy forces; the second deals with location of a probable attack by enemy forces. Rationales and statistical techniques are discussed. In two separate studies of decision making, sequences of data generated by these processes were successfully incorporated. Results reported suggest the feasibility and utility of model development for simulation research on man-machine systems. (Author)

AD-478 089 See Field 14E

AD-641 326 See Field 5B

15E. LOGISTICS

AD-641 335 Field 15E
CFSTI Prices: HC$3.00 MF$0.75
RAND Corp., Santa Monica, Calif.
A MODEL FOR THE DESIGN AND EVALUATION OF AIR CARGO SYSTEMS,
by R. B. Fetter, and R. C. Steorts. Oct 66, 83p
RM-4801-PR
Contract AF 49 (638)-1700

Descriptors: (*Cargo, Air transportation), (*Air transportation, Operations research), Costs, Logistics, Mathematical models, Computers, Linear programming, Systems engineering, Programming (Computers), Programming languages.

Identifiers: LOGAIR, SIMSCRIPT.

How best to transport cargo by air, given a certain set of constraints, is an important and costly area of logistics. This Memorandum describes a model for analyzing two basic problems in the design and operation of such a system: (1) evaluating the system in terms of cost and ability to satisfy specified constraints (e.g., all routes to require less than some given time interval); and (2) developing a flight structure (planes, routes, schedule) for moving the cargo that will minimize cost subject to the specified constraints. The programs and operating procedures described can accomplish both tasks, quickly and economically. (Author)

AD-641 506 Field 15E, 5C
CFSTI Prices: HC$2.00 MF$0.50
McDonnell Aircraft Corp., St. Louis, Mo.
TECHNICAL AND ECONOMIC EVALUATION OF AIRCRAFT FOR INTERCITY SHORT-HAUL TRANSPORTATION. VOLUME I.
Final rept.
Apr 66, 47p
Contract FA-65-WA-1246
FAA-ADS-74-Vol-1
See AD-641 507 and AD-641-508.

Descriptors: (*Air transportation, *Economics), (*Short take-off planes, Economics), (*Vertical take-off planes, Economics), Commercial planes, Costs, Airports, Air traffic, California, Simulation, Operation.

This report evaluates the potential airline use of STOL/VTOL aircraft to serve intercity short haul travelers. The air travel market in the California Corridor (between Los Angeles and San Diego on the south and Sacramento and San Francisco on the north) was used for the study but the results would be generally applicable to other areas. Based on 1970 technology, four STOL and VTOL aircraft configurations were designed as 60-, 90-, and 120-passenger transports, and developed for lowest operating costs for a 500-mile stage length. A conventional jet transport was used as a base of reference and a conventional helicopter was included for comparison. The special STOL/VTOL airports were located for passenger convenience and acceptable noise levels for the surrounding areas. To evaluate STOL/VTOL economic viability, STOL and VTOL airline service was simulated in the California Corridor in 1975 and 1980, and then compared with the conventional jet simulation in those years. It was found that the time savings and convenience provided by either STOL or VTOL airline service would enable STOL or VTOL to capture a substantial share of the short-haul air travel market when combined in a system with conventional jets, and would induce additional air travel. This system would give a satisfactory return on investment. The report is in three volumes. Volume I is an executive summary containing introduction, conclusions, and the summary of method and results. Volume II develops each step in the method, and lists results in greater detail. Volume III contains appendices. (Author)

AD-641 507 Field 15E, 5C
CFSTI Prices: HC$5.00 MF$1.00
McDonnell Aircraft Corp., St. Louis, Mo.
TECHNICAL AND ECONOMIC EVALUATION OF AIRCRAFT FOR INTERCITY SHORT-HAUL TRANSPORTATION. VOLUME II.
Final rept.
Apr 66, 190p
Contract FA-65-WA-1246
FAA-ADS-74-Vol-2
See also AD-641 506 and AD-641 508.

Descriptors: (*Air transportation, *Economics), (*Short take-off planes, Economics), (*Vertical take-off planes, Economics), Commercial planes, Costs, Airports, Air traffic, California, Simulation, Airplane noise, Operation.

This report evaluates the potential airline use of STOL/VTOL aircraft to serve intercity short haul travelers. The air travel market in the California Corridor (between Los Angeles and San Diego on the south and Sacramento and San Francisco on the north) was used for the study but the results would be generally applicable to other areas. Based on 1970 technology, four STOL and VTOL aircraft configurations were designed as 60-, 90-, and 120-passenger transports, and developed for lowest operating costs for a 500-mile stage length. A conventional jet transport was used as a base of reference and a conventional helicopter was included for comparison. The special STOL/VTOL airports were located for passenger convenience and acceptable noise levels for the surrounding areas. To evaluate STOL/VTOL economic viability, STOL and VTOL airline service was simulated in the California Corridor in 1975 and 1980, and then compared with the conventional jet simulation in those years. It was found that the time savings and convenience provided by either STOL or VTOL airline service would enable STOL or VTOL to capture a substantial share of the short-haul air travel market when combined in a system with conventional jets, and would induce additional air travel. This system would give a satisfactory return on investment. The report is in three volumes. Volume I is an executive summary containing introduction, conclusions, and the summary of method and results. Volume II develops each step in the method, and lists results in greater detail. Volume III contains appendices. (Author)

AD-641 508 Field 15E, 5C
CFSTI Prices: HC$5.00 MF$1.00
McDonnell Aircraft Corp., St. Louis, Mo.
TECHNICAL AND ECONOMIC EVALUATION OF AIRCRAFT FOR INTERCITY SHORT-HAUL TRANSPORTATION. VOLUME III.
Final rept.
Apr 66, 178p
Contract FA-65-WA-1246
FAA-ADS-74-Vol-3
See also AD-641 507 and AD-641 506.

Descriptors: (*Air transportation, *Economics), (*Short take-off planes, Economics), (*Vertical take-off planes, Economics), Commercial planes, Costs, Airports, Air traffic, California, Simulation, Operation, Airplane noise.

This report evaluates the potential airline use of STOL/VTOL aircraft to serve intercity short haul travelers. The air travel market in the California Corridor (between Los Angeles and San Diego on the south and Sacramento and San Francisco on the north) was used for the study but the results would be generally applicable to other areas. Based on 1970 technology, four STOL and VTOL aircraft configurations were designed as 60-, 90-, and 120-passenger transports, and developed for lowest operating costs for a 500-mile stage length. A conventional jet transport was used as a base of reference and a conventional helicopter was included for comparison. The special STOL/VTOL airports were located for passenger convenience and acceptable noise levels for the surrounding areas. To evaluate STOL/VTOL economic viability, STOL and VTOL airline service was simulated in the California Corridor in 1975 and 1980, and then compared with the conventional jet simulation in those years. It was found that the time savings and convenience provided by either STOL or VTOL airline service would enable STOL or VTOL to capture a substantial share of the short-haul air travel market when combined in a system with conventional jets, and would induce additional air travel. This system would give a satisfactory return on investment. The report is in three volumes. Volume I is an executive summary containing introduction, conclusions, and the summary of method and results. Volume II develops each step in the method, and lists results in greater detail. Volume III contains appendices. (Author)

AD-641 611 Field 15E
CFSTI Prices: HC$5.00 MF$1.00
Southern California Labs., Stanford Research Inst., South Pasadena.
AN ANALYSIS OF INTERCITY PASSENGER TRAFFIC MOVEMENT WITHIN THE CALIFORNIA CORRIDOR THROUGH 1980.
Final rept.,
by William L. Metzger, and Howard R. Ross. Apr 66, 190p
Contract FA-65-WA-1344
Proj. SRI-SEU-5589
FAA-ADS-75

Descriptors: (*Traffic, California), Analysis, Passenger vehicles, Railroads, Air traffic, Transportation, Costs, Statistical analysis, Time, Short take-off planes, Vertical take-off planes, Commercial planes.

Analysis of intercity passenger traffic moving within the California Corridor, between Sacramento on the north and San Diego on the south, through 1980. Projects passenger traffic between 13 selected city pairs, allocates this traffic among various modes of transportation, and assesses technological developments in surface transportation systems within the Corridor, and impact of these developments on competitive positions of various modes. Surface transport systems now serving these markets as well as proposed new types of high-speed systems were examined. Allocations between air and surface modes was based on fixed wing technology, leaving to a companion McDonnell Aircraft Study assessment of the competitive capabilities of more advanced types of short-haul aircraft such as V/STOL. Traffic by all modes in 13 markets projected to grow at an average annual rate of 6.5 percent through 1980 to 178 million passengers. Private auto will continue as dominant competitor in these markets, based on low operating costs. Bus market participation to decrease. Rail passenger service to disappear. New high-speed ground transportation systems possibly serving these markets (but not before 1980)--with purported speed potential equal to or exceeding present aircraft--pose unresolved technical and economic problems. Plans for development of new air systems to serve these markets beyond 1980 should be closely coordinated with Department of Commerce research on new ground systems. (Author)

AD-641 700 Field 15E
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Los Angeles. Dept. of Engineering.
SIMULATION ANALYSIS OF THE MARINE PORT-COMPLEX.
Final rept.,
by A. M. Feiler. Oct 66, 65p Rept. no. 66-12
Contract Nonr-233 (89)
Proj. NR-347-002

Descriptors: (*Shipping (Marine), Simulation), (*Systems engineering, Shipping (Marine)), Harbors, Computers, Logistics, Transportation, Simulators, Monte Carlo method, Armed forces transportation, Cargo, Handling.

Identifiers: TRANSIM.

The purpose of the project was to conduct a systems analysis of a selected marine port-complex as a demonstration of the application of the computer simulation technique, TRANSIM, to solution of port-complex problems. A marine port-complex is defined to include land access and ship systems, in addition to port and terminal facilities, proper. The specific port situation selected for analysis is the Military Ocean Terminal, Bay Area, Oakland, California, in connection with the embarkation of a U. S. Army Infantry ROAD Division. The Division traffic is superimposed upon normal MOTBA Traffic levels. The systems analysis was conducted in two phases. First, a simulation of the MOTBA port-complex was based on utilization of the current physical plant, manpower resources and planning factors. A second simulation incorporated in the system model certain changes designed to eliminate the bottlenecks, congestion points, and inefficient utilization of the physical plant which were identified as a result of the initial simulation. The analysis results indicated that the computer simulator, TRANSIM, is particularly suited to the analysis of the marine port-complex. The minor changes investigated resulted in an 8.1% decrease in Division throughput time and a 12% decrease in average cargo unit throughput time. (Author)

AD-641 890 Field 15E, 5C
CFSTI Price: MF$1.25
Department of Justice, Washington, D. C.
IDENTICAL BIDDING IN PUBLIC PROCUREMENT.
Jul 66, 248p
Report of the Attorney General (5th) under Executive Order 10936.
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402 $1.50.

Descriptors: (*Government procurement, Commerce), Costs, Analysis, Materials, Tables.

Identifiers: Bidding.

The volume of procurement affected by identical bidding in 1965 was $58.7 million, up $16.1 million from 1964. Two factors appear to have been responsible for this increase, first the initiation of reporting of identical bid affected procurement by a Federal agency with multimillion-dollar, annual procurements in a product traditionally affected by identical bidding, and second, the rise in the volume of public procurement over the preceding year. The addition of a large volume of procurement not heretofore reported distorts the comparability of 1965 volume with that of preceding years. When appropriate adjustments are made, however, to achieve comparability, it is found that the volume of Federal and State and Local procurement affected by identical bidding in 1965 was about 5.3 percent above 1964. This increase is roughly equivalent to the percentage increase in all advertised public procurement between 1964 and 1965. Consequently the ratio of identical bid procurement per dollar of advertised procurement in 1965 of five-tenths of 1 percent was only slightly above the 1964 ratio of four-tenths of 1 percent. (Author)

AD-85 471 Field 15E, 14A, 14D
CFSTI Prices: HC$3.60
RAND Corp., Santa Monica, Calif.
THE COST OF UNRELIABILITY OF AIR FORCE AIRBORNE ELECTRONIC EQUIPMENT AS PRESENTED BY THE COST OF MAINTENANCE.
Research memo.,
by R. L. Kirkwood, and L. W. Sepmeyer. 3 Dec 52, 32p RM-1002
Contract AF 33 (038)-6413

Descriptors: (*Reliability (Electronics), *Cost effectiveness), (*Electronic equipment, Airborne), Maintenance, Air force equipment.

In order to know how much may be economically invested in obtaining reliability it is necessary to have some idea of how much the present level of unreliability is costing. In order to obtain some information on this subject, this study on the cost of maintenance of Air Force airborne electronic equipment was undertaken in the Reliability Group of RAND's Electronics Division. This memorandum presents the results of this study. At the present time Air Force maintenance cost is about two dollars per year for every dollar of capital investment in airborne electronic equipment. It is concluded that more than twice the present cost level could be paid for equipment in order to halve present failure rates and maintenance requirements before any additional net overall cost of the equipment would result. (Author)

PB-173 419 Field 15E
CFSTI Prices: HC$8.60 MF$2.25
Booz, Allen Applied Research, Inc., Bethesda, Md.
ANALYSIS OF THE FUNCTIONS OF TRANSPORTATION: A CONCEPTUAL FRAMEWORK.
Jun 66, 560p Rept. no. 0613
Contract CPR-11-2630
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*United States Government, Research program administration), (*Transportation, *Systems engineering), Performance (Engineering), Pattern recognition, Functions, Mathematical models, Mathematical logic, Flow charting, Traffic, Passenger vehicles, Cargo, Safety, Urban planning, Human engineering.

The report summarizes work performed by Booz, Allen Applied Research Inc. under Bureau of Public Roads Contract CPR-11-2630 during the period from April 15, 1965 to April 15, 1966. The contract stipulates that the contractor: (1) Find the essential characteristics of transportation, (2) Develop a preliminary, analytic methodology systematizing these essential characteristics and their functional interactions. To accomplish these objectives, four tasks must be addressed: Task 1 - Definition of Requirement Characteristics, Task 2 - Definition of Performance Characteristics, Task 3 - Definition of Constraint Characteristics, Task 4 - Development of a Preliminary Generalized Model of Transportation. The work undertakes to conceptualize U. S. transportation by use of the systems analysis technique. It is concerned with the development of the systems analysis structure, the major subprograms, and the estimating relationships for each subprogram. A sample calculation is included to demonstrate the overall computational sequence and the manner in which subprograms are interrelated.

AD-241 637 See Field 1C

AD-641 336 See Field 5A

AD-641 365 See Field 5A

AD-641 644 See Field 13F

AD-641 964 See Field 5I

15F. NUCLEAR WARFARE

AD-463 787 Field 15F, 5J, 6E
CFSTI Price: HC$3.00
Human Resources Research Office, George Washington Univ., Alexandria, Va.
HUMAN FACTORS IN TACTICAL NUCLEAR COMBAT.
Technical rept.,
by Robert Vineberg. Apr 65, 99p TR-65-2
Contract DA-44-188-ARO-2
Proj. DA-2J024701A71201

Descriptors: (*Nuclear warfare, Stresses (Psychology)), (*Tactical warfare, Nuclear weapons), Mental disorders, Reaction (Psychology), Military personnel, Civilian personnel, Fear, Emotions, Neurology, Psychiatry, Nuclear warfare casualties, Fatigue (Physiology), Group dynamics, Training, Game theory, Operations research, Behavior, Mathematical prediction.

Identifiers: Combat fatigue, War gaming.

The general objectives of this study are to draw together information that may provide bases for predicting human behavior in nuclear warfare, to analyze this information for implications concerning possible preparation for such warfare, and to develop a means for estimating the psychological

casualties that are likely to occur on the nuclear battlefield. (Author)

15G. OPERATIONS, STRATEGY, AND TACTICS

AD-224 572 **Field 15G**
CFSTI Price: HC$1.10
RAND Corp., Santa Monica, Calif.
BASIC SURVIVAL PROBABILITY EXPRESSIONS FOR AIR COMBAT MODELS.
Research memo.,
by G. E. Gompf. 22 Aug 49, 5p RM-240

Descriptors: (*Survival, *Probability), (*Aerial warfare, Model theory).

Air combat models for use in attrition studies can be developed from several basic bomber survival probability expressions, depending upon the assumptions made regarding the distribution of interceptor fighter attacks per bomber. Throughout the paper, the air combat is considered as taking place in successive stages or waves, each stage consisting of one attack by each interceptor. The survivors of the first stage then engage in the second stage, and so on in step fashion until the interceptors must withdraw for lack of fuel or ammunition. To keep the analysis in basic form, the interceptor losses during each attack stage will be disregarded since such losses can be accounted for in the more refined combat picture.

AD-227 738 **Field 15G, 1B, 12B**
CFSTI Price: HC$9.60
RAND Corp., Santa Monica, Calif.
THE FLIGHT OPERATIONS PLANNER.
Research memo.,
by W. M. Jones, Marvin B. Shapiro, and Norman Z. Shapiro. 16 Jul 59, 94p RM-2415
Contract AF 33 (038)-6413

Descriptors: (*Air Force operations, *Digital computers), Jet bombers, Jet fighters, Flight, Refueling, Transport planes.

The paper is in two parts. Part One is a general description of the problem involved in planning the operation of large numbers of long-range aircraft and a brief description of the particular part of the problem which is addressed by the Flight Operations Planner (FLIOP). This Part is designed to be of interest to the general reader. Part Two is, in its main body, a somewhat more technical description of the technique. It is believed that Part Two will be of interest to those people who might consider using or preparing to use the routine here described. The appendices should be of interest to FLIOP users. Although the B-47 and KC-97 aircrafts are used in the subsequent parts of this paper for illustrative purposes, the techniques described have proved to be equally applicable to the various models of the B-52, B-58, B-66, KC-135, KB-50, F-101, C-124, C-130, C-133 and can be applied to any fixed wing type aircraft. (Author)

AD-453 658 **Field 15G, 7E**
CFSTI Price: HC$2.00
Krueger (John W.) Research Lab., Madison, Wis.
COMPOUNDS TO CHANGE COLOR WITH ENVIRONMENTAL CHANGE.
Final technical rept.,
by John W. Krueger, and Patrick C. Gokey. 30 Sep 64, 36p
Contract DA-31-124-ARO (D)-125
Projs. DA-20010501B700, ARO (D)-P-4453
AROD-4453:1

Descriptors: (*Photochromism, Camouflage), Colors, Intensity, Illumination, Impregnation, Rubber, Effectiveness, Synthesis (Chemistry), Condensation reactions, Aromatic compounds, Amines, Aldehydes, Polycyclic compounds, Fluorescence, Stability.

Some classes of photochromic compounds and processes were studied and of these anils were of most interest for our immediate camouflage purpose. One compound, among many prepared and studied (mostly anils) gave us a new conception of an automatically changing camouflage in which changes would take place in seconds or less. This known dianil of meta phenylenediamine and salicylaldehyde (I) was previously reported to change from yellow to orange. The changes from sunlight to shade were in seconds or less and thus the original concept that camouflage color changes would take minutes, hours or overnight was abandoned. I was of further interest because of its resistance to fatigue during a summer of natural sunlight exposure. I was also shown to have not only the known changes from yellow to orange but in intensified sunlight the compound changed from orange to red and reverted as illumination decreased. (Author)

AD-641 956 **Field 15G, 5D**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE SHORT RUN AND THE LONG WALK. (PARTS I AND II),
by Amrom H. Katz. Oct 66, 25p P-3470

Descriptors: (*Southeast Asia, Limited war), Vietnam, Foreign policy, Political science, History, Communism, Counterinsurgency, Warfare, Government (Foreign).

Identifiers: Peace.

Approaches to peace in Southeast Asia are examined and discussed. It is concluded that 'Military success is a necessary, but insufficient condition for a favorable outcome in Southeast Asia. However, expensive and inefficient, military success can only provide the background requirement for progress toward justice, economic improvement and government stability. But without military success, there is no hope for progress.' (Author)

AD-449 505 **See Field 7C**

AD-641 964 **See Field 5I**

16A. MISSILE LAUNCHING AND GROUND SUPPORT

AD-641 560 **See Field 4B**

AD-641 744 **See Field 4B**

16B. MISSILE TRAJECTORIES

AD-641 982 **Field 16B, 9C, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
TRAJECTORY DATA OBTAINABLE FROM DOVAP REDUCTIONS AT THE FIRING LOCATION.
Memorandum rept.,
by W. Berning, and J. R. Wullert. Jan 50, 38p
BRL-MR-503
Proj. TB3-0538A

Descriptors: (*Guided missile trajectories, Data), (*Doppler systems, *Trajectories), Velocity, Position finding, Electronic equipment, Launching sites, Reduction, Data processing systems, Numerical analysis.

Identifiers: DOVAP.

Based on the assumption that processing of the photographic film is not considered a time element in obtaining quick approximate data, two general methods are discussed for obtaining total cycle counts from a relatively small sampling of the recorded data. These two methods are: (1) the integration of doppler frequency-time curves by a rolling planimeter; and, (2) the integration of these curves by means of Simpson's Parabolic Rule. The use of these methods in practice is discussed and the obtaining of frequency-time curves considered in detail. It is found that in the hands of a skilled operator the rolling planimeter yields slightly more accurate total count data, but for general operation Simpson's Parabolic Rule is the more desirable. Accuracies obtainable are considerably better than those of Radar. Incidental to the methods of determining total cycle counts is a simplified computational procedure for obtaining trajectory data from the cycle counts utilizing the total count data from four receiver stations. This simplified computational method is put in a form useful for obtaining data with the greatest possible rapidity. (Author)

AD-641 963 **See Field 8E**

AD-641 979 **See Field 8E**

16D. MISSILES

N66-33502 **Field 16D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A NIKE FAILURE STUDY.
by A. Hisler. Mar 66, 28p NASA-TM-X-55549, X-721-66-98

Descriptors: *Aerobee rocket, *Combustion instability, *Failure mode, *Nike-apache rocket, Booster, Combustion, Defect, Failure, Flight, Grain, Instability, Mode, Motor, Sounding, Sustainer.

For abstract, see STAR 04 19.

AD-457 167 **See Field 5I**

AD-468 425 **See Field 9F**

AD-641 495 **See Field 14D**

17A. ACOUSTIC DETECTION

AD-454 575 **Field 17A, 20A**
CFSTI Price: HC$2.00
Navy Mine Defense Lab., Panama City, Fla.
THEORETICAL AND EXPERIMENTAL PROPAGATION OF ELASTIC WAVES IN AN AIR-FLUID-SOLID AND IN AN AIR-FLUID-SOLID-SOLID SYSTEM.
Interim rept., 1 Dec 63-24 Aug 64,
by A. S. Victor, and E. G. McLeroy. Jan 65, 46p
Rept. no. I-68
Proj. SR0110101
Task 0401-1

Descriptors: (*Mechanical waves, Elasticity), (*Elasticity, Propagation), Theory, Pressure, Sound, Fluids, Time, Model tests, Water, Surface properties, Reflection, Air mathematical analysis, Equations.

This report presents a comparison of the theoretical and experimental waveforms of the pressure response due to an impulsive source in an airfluid-solid and an air-fluid-solid-solid system. The theoretical expressions derived by spitznogle for the inclusion of the surface arrivals due to the water-air interface have been evaluated by computer techniques. They have been added to the results of the fluid-solid-solid theory to obtain the complete pressure response as a function of time. The experimental waveforms that are obtained in the laboratory compare favorably with the waveforms that are theoretically derived. This investigation should prove useful in predicting the total pressure response in either-shallow or deep water environments when the pressure is due to an impulsive source. (Author)

AD-641 361 **Field 17A, 13L**
CFSTI Prices: HC$1.00 MF$0.50
Navy Mine Defense Lab., Panama City, Fla.
THE DEVELOPMENT OF A SWIMMER TRACKING DEVICE.
Interim rept., Jul 65-Jan 66,
by W. W. Mullen, Jr. Oct 66, 24p i-108
Proj. SF-011-06-03
Task 11507

Descriptors: (*Swimming, Underwater tracking), (*Underwater tracking, Acoustic equipment), (*Diving, Safety devices), Sonar receivers, Transistors, Oscillators, Transducers, Naval training.

A swimmer tracking device consisting of acoustic markers and a receiver has been developed by the U. S. Navy Mine Defense Laboratory to provide a means of tracking Navy swimmers during training exercises. The acoustic markers are tunable from 29 kHz (kilohertz, kilocycles per second) to 45 kHz and may be manually switched between continuous wave (CW) and pulse modes of operation. The receiver is a Mark 16 Mod O sonar receiver modified to improve its selectivity and image rejection. With the modified receiver located on a safety boat, the bearings to markers located on swimmers can be determined, and they can be identified by their marker frequencies. As many as seventeen swimmer pairs can be tracked, even at distances exceeding 1000 yards. (Author)

AD-641 669 **Field 17A**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
A SOUND/RANGING TECHNIQUE FOR LOCATING SUPERSONIC MISSILES,
by Henry Rachele. May 66, 29p
Task 1V014501B53A-10
ECOM-5055

Descriptors: (*Acoustic detectors, Guided missiles), (*Range finding, Acoustic detectors), Mathematical models, Descent trajectories, Guided missile detection, Determination, Microphones, Configuration.

Mathematical formulations are developed which can be used with conventional sound-ranging data for determining a first approximation of a point on a trajectory of a vertically falling supersonic missile. The most interesting feature of the development is that it requires only a single four-microphone square array. (Author)

AD-455 096 **See Field 11G**

17B. COMMUNICATIONS

AD-463 062 **Field 17B, 17G, 9C, 1D**
CFSTI Price: HC$2.60
Naval Research Lab., Washington, D. C.
LONG RANGE FLIGHT TESTS OF THE OMEGA AIRCRAFT RECEIVER.
Interim rept. no. 6,
by A. F. Thornhill, and M. F. Williams. 28 May 62, 28p NRL-MR-1325

Descriptors: (*Radio navigation, Radio receivers), (*Radio receivers, Radio navigation), Low frequency, Errors, Ranges (Distance), Aircraft, South America, Arctic regions, Flight testing, Diurual variations, Propagation, Display systems.

Omega is a very-low-frequency radio navigation system which is characterized by very long range capability and potentially high accuracy. Fixes with an accuracy of one mile or less can be obtained by ships, aircraft and submerged submarines. Flights were made by NRL personnel in a WV-2 aircraft to the Arctic and to South America for a twofold purpose: (1) to evaluate the performance of the Omega aircraft receiver on long range flights and (2) to obtain propagation data by monitoring the signals at each stop for several days. This report is an account of the performance of the aircraft receiver. During the trip, three flights (about 3000 miles total) were made in areas for which local Omega charts were available: (1) from New Orleans to Panama, (2) from Panama to Manta, Ecuador, and (3) from Long Island in the Bahamas to Washington, D. C. The Omega position fixes on these flights are plotted on Omega charts in this report. The results were excellent. The effect of diurnal shifts and the use of propagation data to correct for the diurnal shifts when plotting the flights are discussed. Maximum usable range of the Haiku, Hawaii Omega station (3 kw radiated) was more than 7000 miles, maximum usable range of the Summit, Panama station (3 kw radiated) was more than 5000 miles and maximum range of the Forestport, New York station (0.25 kw radiated) was more than 3000 miles. (Author)

AD-481 365 **Field 17B, 17G, 9C**
CFSTI Prices: HC$2.60 MF$0.50
Naval Research Lab., Washington, D. C.
AIRBORNE OMEGA RECEIVER.
Interim rept. no. 3,
by R. J. Lampkin, and A. F. Thornhill. 16 Nov 60, 27p NRL-MR-1118

Descriptors: (*Radio receivers, *Hyperbolic navigation), Airborne, Very low frequency, Aircraft equipment, Phase measurement, Mechanical drawings, Intermediate frequency amplifiers, Automatic gain control, Servomechanisms, Power supplies, Servo amplifiers, Timing circuits.

It is desired that techniques for the Omega navigation system be developed to permit its use in aircraft. Omega utilizes a hyperbolic grid of isophase lines established by VLF transmitters. It is characterized by very long range capability and potentially high accuracy. This third interim report is concerned with progress on the airborne receiver.

AD-481 367 **Field 17B, 17G, 9C, 1D**
CFSTI Prices: HC$2.00 MF$0.50
Naval Research Lab., Washington, D. C.
AIRBORNE OMEGA RECEIVER.
Interim rept. no. 5,
by Evans L. Klein. 5 Feb 62, 26p NRL-MR-1268

Descriptors: (*Navigation, *Servomechanisms), (*Global communication systems, Navigation), Airborne, Very low frequency, Phase measurement, Velocity, Phase shifters, Phase detectors, Feedback, Gain, Damping, Potentiometers, Tachometers.

Techniques for the Omega navigation system are being developed to permit its use in aircraft. Omega utilizes a hyperbolic grid of isophase lines established by VLF tansmitters. It is characterized by very long range capability and potentially high accuracy. This fifth interim report is concerned with an analysis of the phase servo system used in the airborne receiver.

AD-641 325 **Field 17B, 9D**
CFSTI Prices: HC$3.00 MF$0.75
Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
ERROR BOUNDS FOR PARALLEL COMMUNICATION CHANNELS.
Technical rept.,
by Paul M. Ebert. 1 Aug 66, 94p TR-448
Contract DA-36-039-AMC-03200 (E), Grant NSF-GP-2495
Proj. DA-200-14501-B31F

Descriptors: (*Errors, *Communication systems), (*Coding, Probability), Information theory, Optimization, Decoding.

The report is concerned with the extension of known bounds on the achievable probability of error with block coding to several types of paralleled channel models. One such model is that of non-white additive Gaussian noise. The author is able to obtain upper and lower bounds on the exponent of the probability of error with an average power constraint on the transmitted signals. The upper and lower bounds agree at zero rate and for rates between a certain R crit and the capacity of the channel. The surprising result is that the appropriate bandwidth used for transmission depends only on the desired rate and not on the power or exponent desired over the range wherein the upper and lower bounds agree. He also considers the problem of several channels in parallel with the option of using separate coders and decoders on the parallel channels. He finds that there are some cases in which there is a saving in coding and decoding equipment by coding for the parallel channels separately. He determines the asymptotic ratio of the optimum blocklength for the parallel channels and analyze one specific coding scheme to determine the effect of rate and power distribution among the parallel channels. (Author)

AD-641 399 **Field 17B, 13A**
CFSTI Prices: HC$1.00 MF$0.50
Hanovia Lamp Div., Engelhard Industries, Inc., Newark, N. J.
IMPROVEMENT OF COMMUNICATION ARC LAMPS FOR VISIBLE AND INFRARED SIGNALLING EQUIPMENT.
Progress rept. no. 3, 1 Apr-31 Aug 66,
by M. Skal. 31 Aug 66, 15p
Contract Nobsr-93090
Proj. SF0060502
Task 7006
See also AD-619 287.

Descriptors: (*Signal lights, Electric arcs), (*Xenon lamps, Signal lights), Light communication systems, Communication equipment, Reliability (Electronics), Performance (Engineering).

A prototype self-starting 300 watt xenon lamp was developed and the first test results are reported.

AD-641 431 **Field 17B, 9D**
CFSTI Prices: HC$6.00 MF$1.25
Electro Technical Analysis Corp., Tucson, Ariz.
FREQUENCY ASSIGNMENT STUDIES.
Interim final rept., 1 May-31 Jul 66,
by A. J. Hoehn, and T. W. McCurnin. Sep 66, 202p
Contract DA-28-043-AMC-01232 (E)
Proj. DA-1E6-20501-D44901
ECOM-01232-1F
See also AD-636 592.

Descriptors: (*Radiofrequency, Scheduling), (*Electromagnetic compatibility, Radio communication systems), (*Radio communication systems, Tactical warfare), Frequency, Military requirements, Information theory, Radio transmission, Networks, Mixers (Electronics), Radio receivers, Mathematical models, Graphics.

Identifiers: Frequency allocation.

This is a report on a study to improve electromagnetic compatibility in the field army through development of frequency-assignment practices. Detailed instruction is given in the fundamentals and use of the synthesis method of frequency assignment. Comparisons are made with the present ABM plan. Simplified templates for the determination of far-site assignment exclusions are presented. Assignment of frequencies to radio-relay and radio-net systems is illustrated in detail. In the theoretical sections previous work is expanded and consolidated where necessary to present a complete account of the year's work. The general frequency-assignment problem is defined in terms of exclusions imposed by the physical nature of equipments and geographic locations. The problem is formalized through use of mathematical set theory, and solutions discussed. The basis for design of frequency groups which automatically satisfy the set theory expressions is established.

Methods for replication of assignments and the combination of the replication scheme with the frequency-group method are covered. Optimization methods, and problems arising from intermodulation and adjacent-channel interference are considered.

AD-641 501 **Field 17B, 22B**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
LINE SCAN TELEVISION FOR EARTH OBSERVATION SATELLITES.
Technical memo.,
by C. J. Swet. Sep 66, 31p TG-853
Contract NOw-62-0604

Descriptors: (*Television communication systems, *Meteorological satellites), Television cameras, Scanning, Earth (Planet), Effectiveness, Orbital trajectories.

Studies indicate that line-scan television in the visible spectrum offers numerous advantages over conventional snapshot techniques for observing the earth from a satellite. These studies include the investigation of several camera design concepts, one which is described here to illustrate the current state of the art. They also included a parametric examination, summarized here, of coverage and other measures of system effectiveness for a postulated mission. (Author)

AD-641 960 **Field 17B**
CFSTI Prices: HC$1.00 MF$0.50
Naval Submarine Medical Center, Groton, Conn. Medical Research Lab.
THE EFFECT OF FREQUENCY PASSBAND UPON THE INTELLIGIBILITY OF HELIUM-SPEECH IN NOISE.
Interim rept.,
by Russell L. Sergeant. 17 Aug 66, 13p Rept. no. 480
NAVMED-MF011.99-9001.06

Descriptors: (*Speech, Intelligibility), (*Speech recognition, Underwater communication systems), (*Band-pass filters, Audiofrequency), Noise, Respiration, Helium, Oxygen, Controlled atmospheres, Adaptation (Physiology), Signal-to-noise ratio.

Speech spoken after breathing a mixture of helium and oxygen (80%--20%) was combined with white noise and then passed through a variety of band-pass filters. Intelligibility was determined on 16 different groups of 20 listeners each. While intelligibility did not suffer appreciably when frequencies of 300 cs and below were eliminated, the loss of frequencies below 600 cs caused a marked deterioration. Even with severe filtering restrictions of a 600-1200 cs bandpass and a 1-db Speech/Noise ratio, 38% intelligibility was achieved. This indicates that the intelligibility of speech in a helium mixture, as in air, is quite distortion-resistant. The frequency at which high- and low-pass filtering will have equal effects on intelligibility appears to be lower than 1000, in contrast to approximately 1600 cs for speech in air. Reasons for this downward shift are not known. No condition of filtering helium-speech in noise increased its intelligibility. (Author)

N66-32942 **Field 17B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ATMOSPHERIC TRACKING ERRORS AT S-BAND AND C-BAND FREQUENCIES.
by P. E. Schmid. Aug 66, 36p NASA-TN-D-3470

Descriptors: *Annual variation, *C-band, *Diurnal variation, *S-band, *Seasonal variation, *Tracking study, Atmospheric, Diurnal, Earth, Error, Frequency, Ionosphere, Measurement, Microwave, Range, Rate, Season, Study, Tracking, Troposphere, Variation.

For abstract, see STAR 04 19.

N66-33181 **Field 17B**
CFSTI Prices HC$2.00 MF$0.50
Rand Corp., Santa Monica, Calif.
COMMUNICATION SATELLITE OUTPUT DEVICES.
by N. E. Feldman. Sep 64, 39p NASA-CR-59580
Contract NASR-21-02
Submitted For Publication

Descriptors: *Communications satellite, *Semiconductor device, *Solid state device, *Vacuum tube, Amplifier, Amplitron, Communication, Device, Diode, Klystron, Output, Satellite, Semiconductor, Solid, State, Transistor, Travel, Triode, Tube, Tunnel, Vacuum, Varactor, Wave.

For abstract, see STAR 04 19.

AD-227 192 **See Field 9E**

AD-641 320 **See Field 5I**

AD-641 658 **See Field 5E**

AD-641 686 **See Field 9D**

AD-641 839 **See Field 5J**

AD-641 926 **See Field 5E**

EGG-1183-1210 **See Field 18I**

17G. NAVIGATION AND GUIDANCE

AD-101 000 **Field 17G, 1B, 12B**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
APPLICATION OF DYNAMIC PROGRAMMING TO THE AIRPLANE MINIMUM TIME-TO-CLIMB PROBLEM.
Research memo.,
by T. F. Cartaino, and S. E. Dreyfus. 22 Mar 56, 22p RM-1710
Contract AF 33 (038)-6413

Descriptors: (*Dynamic programming, *Flight paths), (*Airplanes, Scheduling), Decision making, Time studies, Acceleration, Optimization.

The dynamic-programming technique developed by R. Bellman is applied to the solution of the airplane minimum time-to-climb problem. A brief introduction to dynamic programming is presented, followed by an exposition of the climb problem and the solution of a typical example case. It is concluded that dynamic programming offers a method of solution for the climb problem which is fast, is readily adaptable to routine engineering calculation, and allows the inclusion of the effects of variations in airplane weight and drag along the flight path. (Author)

AD-102 897 **Field 17G, 1B**
CFSTI Price: HC$1.60
RAND Corp., Santa Monica, Calif.
CLIMB PATH FOR LEAST ELAPSED TIME.
Research memo.,
by N. C. Peterson. 7 Oct 49, 15p RM-245
Contract AF 33 (038)-6413

Descriptors: (*Jet planes, *Flight paths), Time studies, Acceleration, Dynamic programming, Optimization.

The purposes of this note are to examine the suitability of an engineering method which has been in use for determining the path a jet-powered airplane should follow to achieve a specified speed and altitude in the least elapsed time, to indicate the conditions under which the method becomes unrealistic, and to suggest an alternative procedure. Ideally, the optimum acceleration-climb path would be obtained as the solution of a variation problem; this problem has been written out in very general form by Magnus R. Hestenes (RAND RM-100). The solution of this problem has not been found. To obtain the method recommended in this paper the variation problem has been expressed in the least general form which still takes account of the important mechanisms influencing the time consumed by the airplane to accelerate and climb. The solution of the simplified problem is then approximated by a systematic construction. In the recommended method the load factor, flight path angle, and the longitudinal acceleration are considered and the elapsed flight time is expressed as the sum of two integrals, one corresponding to level flight acceleration and the other to the climb at (variable) high speed. The optimum path is at hand when the sum of the integrals is a minimum. (Author)

AD-238 041 **Field 17G, 1B**
CFSTI Price: HC$4.60
RAND Corp., Santa Monica, Calif.
AN IDENTIFICATION SYSTEM FOR USE AS AN AID TO RAID DETECTION AND AIR TRAFFIC CONTROL.
Research memo.,
by W. K. Squires. 13 May 58, 42p RM-2169
Contract 33 (038)-6413

Descriptors: (*Identification systems, *Air traffic control systems), Electronic equipment, Analysis, Very high frequency, Warning systems.

An identification system is proposed whereby all U. S. aircraft and all ZI-penetrating aircraft would be required to carry an operating low-power transmitter emitting the aircraft ID number. The signals would be received by existing VHF receivers at various sites and forwarded to centers for correlation with radar information. Through file and disposition posting techniques, an IFF function is performed. With the addition of altitude to the emitted ID number, and with time-referenced ground station grouping, accurate position information can be obtained for ATC use. With appropriate data processing equipment, this becomes the ID System, a system capable of providing altitude position/ID information on all cooperating aircraft within (at least) the U. S. The ID system does not detect hostile aircraft, but it does permit active detection techniques to 'look-through' a maze of friendly tracks and concentrate on the aircraft of real interest. (Author)

AD-455 274 **Field 17G**
CFSTI Price: HC$1.00
Royal Aircraft Establishment, Farnborough (England).
NOTES ON THE FUNDAMENTAL PROBLEMS INVOLVED IN DETERMINING TRUE NORTH BY GYROSCOPIC METHODS.
Technical note,
by I. L. Thomas. Aug 64, 24p TN-IEE-56

Descriptors: (*Gyroscopes, Navigational aids), Great Britain, Errors, Accelerometers, Gyro compasses.

By considering the basic principles which operate in any system using gyroscopes to determine the direction of True North, an assessment is made of the conditions which must be achieved if this direction is to be accurate to within a few minutes of arc. It is shown that even if the gyroscopes were perfect it would still take several minutes to make an accurate determination of North because of the extremely small rates of rotation which have to be measured. One of the main difficulties is due to movements of the base on which the gyros are mounted; hence the worst case is probably that of an aircraft carrier in rough sea, but a parked aircraft, exposed to gusty condition presents quite a difficult problem. The accuracy requirements

for the gyros and accelerometers are discussed and the operation of a typical system which seeks True North automatically is analysed in some detail. (Author)

AD-641 393 Field 17G
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Dept. of Geology and Geophysics.
AN UNDERWATER SOUND SYSTEM USED FOR ACCURATE POSITIONING.
Master's thesis,
by Michael Leo Howard. Jul 66, 35p
Contract Nonr-1841 (74)
Proj. NR-083-157

Descriptors: (*Position finding, *Underwater sound equipment), Navigational aids.

Identifiers: Theses.

A small battery-driven transponder was developed from an Edgerton pinger, a hydrophone, and an amplifier. The transponder was used in the Charles River. It was demonstrated that distances from the transponder could be determined to within 2.7 feet. The maximum distance recorded was 1200 feet. As further application of the transponder, it was decided to attempt to run a search pattern of a series of concentric circles with the transponder at the center. Due to difficulties in equipment other than the transponder, it proved difficult to cruise in such a circle. With the transducer looking at the bottom, the transponder ceased to run in sync at distances greater than 400 feet. (Author)

AD-641 502 Field 17G, 9B
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
STANDARDS AND SPECIFICATIONS FOR MYLAR FAN-FOLDED PERFORATOR TAPE TO BE USED WITH THE AN/BRN-3 RADIO NAVIGATION SET.
Technical memo.,
by T. D. Mock. Sep 65, 9p TG-729
Contract NOw-0604

Descriptors: (*Tapes, Polyester plastics), (*Radio navigation, Tapes), Standards, Specifications, Programming (Computers), Navigation computers, Radio equipment, Manufacturing methods.

Identifiers: AN/BRN-3.

The report serves as a specification for procuring mylar fan-fold perforator tape stock and as a standard for reproducing AN/BRN-3 computer programs on perforated tape.

AD-641 698 Field 17G
CFSTI Prices: HC$4.00 MF$1.00
National Aviation Facilities Experimental Center, Atlantic City, N. J.
NEW YORK INTERIM COMMON TRACON FACILITY SIMULATION STUDY.
Final rept.,
by Ricardo Cassell. Jul 66, 135p
Proj. FAA-150-511-01V
SRDS-RD-66-42

Descriptors: (*Air traffic control systems, New York), Air traffic control terminal areas, Simulation, Display systems, Configuration.

Simulation studies of a plan for an interim common terminal radar control facility to serve the New York metropolitan area were conducted at the National Aviation Facilities Experimental Center, Atlantic City, New Jersey. The studies were divided into two phases. In the first phase, equipment and controller arrangement configurations were explored and a single configuration was ultimately developed. In the second phase, the plan was evaluated using the configuration developed. It was concluded that the basic console design provided adequate space for all anticipated required equipments and allowed for optimum controller placement for large screen display viewing. The console design was not considered optimum for the positions located at a second row of consoles since these positions did not use the large screen displays. The equipment configuration provided an environment in which intrafacility coordination was facilitated. It was recommended that further study and evaluation of the Eidophor projection system and large screen display presentations be conducted prior to the introduction of this type of display into an operational facility. (Author)

AD-641 719 Field 17G
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE LONG PERIOD ERRORS OF DOPPLER AND INERTIAL NAVIGATION SYSTEMS.
Technical rept.,
by S. G. Smith, and I. L. Thomas. Mar 66, 27p
TR-66084

Descriptors: (*Doppler navigation, Errors), (*Inertial navigation, Errors), Great Britain, Equations.

Dead reckoning navigation systems making use of gyros have to take account of the earths rotation and the vehicles motion round the earth since these rotations will be sensed by the gyros. In general the gyro correction terms are functions of latitude and therefore the system generates a feedback loop within itself since the final output (latitude) is used to correct the mechanism which is producing this output. By good fortune the sense of this feedback in most cases is such that the errors are oscillatory rather than divergent. The period of oscillation is 24 hours for a stationary I.N. system but in general this is modified by the E-W component of vehicle velocity. The effects are shown to have little significance in Doppler systems but are helpful in some cases of long flights (> 4 hours) with inertial systems. (Author)

AD-641 962 Field 17G
CFSTI Prices: HC$1.00 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
VOR LOCALIZER (VORLOC).
Interim rept.,
by Frederick W. Marschall. Oct 66, 24p
Proj. 320-101-03X
SRDS-RD-66-52

Descriptors: (*Terminal guidance, Azimuth), (*Air traffic control systems, Terminal guidance), Radio navigation, Radio equipment, Very high frequency, Effectiveness.

Identifiers: VORLOC.

The report describes a low cost system called VORLOC. This equipment was designed to be used in a manner similar to a standard localizer but operates on VOR frequencies with the standard VOR receiver and instrumentation. The results of tests conducted indicate that the quality of the course line of VORLOC is subject to its siting. The course line had an average 95% course path bend amplitude of .51 degrees, with extremes of .99 and .25 degrees. The maximum range was 31 miles at 2000 feet altitude and the stability of the course line was .57 degrees per standard deviation. It is concluded that VORLOC has potential as a low cost navigational aid capable of providing localizer-type guidance through a standard VOR receiver. (Author)

AD-85 423 Field 17G, 12A
CFSTI Price: HC$5.60
RAND Corp., Santa Monica, Calif.
STATISTICAL THEORY OF NAVIGATION EMPLOYING INDEPENDENT INERTIAL AND VELOCITY MEASUREMENTS,
by P. Swerling, and E. Reich. 25 Mar 54, 57p RM-1220
Contracts AF 49 (638)-700, AF 33 (038)-0413
See also AD-85 982.

Descriptors: (*Inertial navigation, Measurement), Statistical analysis, Theory, Velocity, Instrumentation.

The report discusses the problem of optimum determination of position by a navigating device employing independent inertial and velocity measurements. The measurements are assumed to be subject to random errors. The problem is related to the theory of statistical estimation as well as to filtering theory. Explicit optimum methods of position computation are derived for several special cases. Formulas are derived by means of which the variance of the error in computed position can be determined. The asymptotic variance, for large time of flight, of the error in computed position is discussed. (Author)

AD-85 982 Field 17G, 12A
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
STATISTICAL THEORY OF NAVIGATION EMPLOYING INDEPENDENT INERTIAL AND VELOCITY MEASUREMENTS: MINIMUM RMS ERROR IN COMPUTED POSITION.
Research memo.,
by P. Swerling, and E. Reich. 29 Jun 60, 28p RM-1321
Contract AF 33 (038)-6413

Descriptors: (*Inertial navigation, Measurement), Statistical analysis, Theory, Velocity, Instrumentation, Errors, Position finding.

Analysis of navigation systems employing independent inertial and velocity measurements, begun in (AD-85 423), is continued. Explicit formulas are given for minimum rms error in computed position as a function of time of flight. Curves based on these formulas are presented, showing the results for a number of illustrative cases. (Author)

N66-32957 Field 17G
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
A SYSTEM FOR INERTIAL EXPERIMENT POINTING AND ATTITUDE CONTROL.
by C. Grantham, and P. R. Kurehals. Aug 66, 67p
NASA-TR-R-247

Descriptors: *Attitude control, *Gyroscope, *Manned spacecraft, *Spacecraft control, Aerodynamic, Apollo project, Attitude, Control, Equation, Gradient, Gravity, Inertial, Manned, Moment, Motion, Point, Precession, Spacecraft, Torque.

For abstract, see STAR 04 19.

N66-33448 Field 17G
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
VISUAL SIMULATION OF LUNAR ORBIT ESTABLISHMENT USING A SIMPLIFIED GUIDANCE TECHNIQUE.
by G. K. Miller Jr, and G. W. Sparrow. Aug 66, 37p NASA-TN-D-3524

Descriptors: *Guidance, *Lunar orbit, *Manual control, *Simulation, *Visual task, Approach, Base, Control, Fixed, Lunar, Manual, Orbit, Performance, Pilot, Task, Technique, Thrust, Trajectory, Visual.

For abstract, see STAR 04 19.

N66-33458 Field 17G
CFSTI Prices HC$3.00 MF$0.75
General Precision, Inc., Little Falls, N. J.

STUDY OF QUASI-OPTIMUM FEEDBACK CONTROL TECHNIQUES.
by V. D. Cohen, J. Ellis, B. Friedland, and F. E. Thau. Aug 66, 96p NASA-CR-527
Contract NAS2-2648

Descriptors: *Differential equation, *Feedback control system, *First order equation, *Optimal control, Application, Control, Equation, Feedback, First, Hamiltonian, Linearization, Optimum, Order, System, Technique, Theory, Vector.

For abstract, see STAR 04 19.

N66-33492 **Field 17G**
CFSTI Prices HC$3.25 MF$1.25
Bendix Corp., Teterboro, N. J. Eclipse-pioneer Div.
STUDY TO DEVELOP THE EQUATIONS DESCRIBING THE CHARACTERISTICS OF RATE AND ATTITUDE SENSORS ASSOCIATED WITH SPACECRAFT CONTROL SYSTEMS.
by J. Clair. Apr 66, 196p NASA-CR-66157
Contract NAS1-4874

Descriptors: *Sensor, *Spacecraft control, Attitude, Control, Equation, Error, Evaluation, Model, Rate, Spacecraft, System.

For abstract, see STAR 04 19.

AD-463 062 **See Field 17B**

AD-481 365 **See Field 17B**

AD-481 367 **See Field 17B**

AD-641 404 **See Field 22C**

17H. OPTICAL DETECTION

AD-641 997 **Field 17H**
Not available from CFSTI.
Naval Medical Research Inst., Bethesda, Md.
EVALUATION OF A SWIMMER'S CONTACT AIR-WATER LENS SYSTEM,
by Kenneth J. Faust, and Edward L. Beckman. Sep 66, 12p
NAVMED-MF-011.99-1001-11
Availability: Published in Military Medicine v131 n9-suppl p779-88 Sep 1966.

Descriptors: (*Eyeglasses, Underwater), Swimming, Visual acuity, Vision, Effectiveness.

Water and the human cornea have virtually the same index of refraction; therefore, without visual aid underwater, the eye loses corneal refractive power and becomes so hyperopic that it is beyond the accommodative capability of the eye resulting in a decrease in visual acuity to less than that of legal blindness. Use of diving masks restores the air-corneal interface and reestablishes visual acuity along the visual axis. Such diving masks are bulky and their form restricts the field of vision. The underwater contact lenses evaluated in this study gave a mean monocular underwater visual field approximately 88 percent of the normal visual field in air whereas a standard swimmer's face mask allowed only 55 percent of the normal field in air. Both the contact lens and face mask enabled subjects with normal vision to read the 20/15 line or better on a Snellen acuity chart underwater. In operational testing, the underwater contact lenses were worn up to three hours in sea water by U. S. Navy divers. The lenses provided excellent vision when swimming underwater, when using a SPU (Swimmers Propulsion Units), and when taking underwater photographs. (Author)

AD-465 151 **See Field 20C**

17I. RADAR DETECTION

AD-101 072 **Field 17I**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
ON THE PROBLEM OF DETERMINING THE POSITION ON A TARGET WITH CONSTANT SIGNAL IN THE PRESENCE OF CIRCUIT NOISE OR CHAFF.
Research memo.,
by A. J. F. Siegert. 13 Sep 55, 21p RM-1643
Contract AF 33 (038)-6413

Descriptors: (*Radar confusion reflectors, *Radar targets), (*Search radar, Detection), Position finding, Reflection, Signal-to-noise ratio, Statistical analysis, Targets.

This memorandum deals with the problem of radar location of a target in one of m possible positions, in the presence of circuit noise or chaff. In previous work done on the problem, an optimum procedure for locating the target was derived under the assumption that the a priori probabilities for the target location are known and are equal for all possible positions of the target. The present discussion shows that this procedure is optimum, according to a reasonable optimization criterion, even if nothing is known about the a priori probabilities for the target location. In addition, bounds are obtained for the probability of correct location of a target, using the optimum procedure, assuming equal noise power in all positions. (Author)

AD-101 287 **Field 17I, 12A**
CFSTI Price: HC$8.60
RAND Corp., Santa Monica, Calif.
A STATISTICAL THEORY OF TARGET DETECTION BY PULSED RADAR,
by J. I. Marcum. 1 Dec 47, 87p RM-754
Contract AF 33 (038)-6413
See also AD-101 882.

Descriptors: (*Radar targets, Detection), (*Statistical analysis, *Detection), Search radar, Probability, Target acquisition.

The report presents data from which one may obtain the probability that a pulsed-type radar system will detect a given target at any range. This is in contrast to the usual method of obtaining radar range as a single number, which can be taken mathematically to imply that the probability of detection is zero at any range greater than this number, and certainty at any range less than this number. Three variables, which have so far received little quantitative attention in the subject of radar range, are introduced in the theory: (1) The time taken to detect the target. (2) The average time interval between false alarms (false indications of targets). (3) The number of pulses integrated. It is shown briefly how the results for pulsed-type systems may be applied in the case of continuous-wave systems. Those concerned with systems analysis problems including radar performance may profitably use this work as one link in a chain involving several probabilities. For instance, the probability that a given aircraft will be detected at least once while flying any given path through a specified model radar network may be calculated using the data presented here as a basis, provided that additional probability data on such things as outage time etc., are available.

AD-101 882 **Field 17I, 12A**
CFSTI Price: HC$4.00
RAND Corp., Santa Monica, Calif.
A STATISTICAL THEORY OF TARGET DETECTION BY PULSED RADAR: MATHEMATICAL APPENDIX,
by J. I. Marcum. 1 Jul 48, 122p RM-753
Contract AF 33 (038)-6413

Descriptors: (*Radar targets, Detection), (*Statistical analysis, *Detection), Search radar, Probability, Target acquisition.

In a previous report (AD-101 287) a statistical theory of radar detection was presented in outline form. The mathematical details were omitted, in order that the main ideas and results might be made available as soon as possible. This report contains the mathematics that led to the results presented in the previous report. In addition, several subjects are briefly discussed that were not covered earlier. These are collapsing loss, antenna beam shape loss, the effect of signal injection, limiting loss, and moving target indication. (Author)

AD-641 355 **Field 17I**
CFSTI Prices: HC$2.00 MF$0.50
Resources Development Inst., Huntington Station, N. Y.
MATCHED INDUCTIVE PLATE RADOME.
Final rept. 1 Mar-31 Aug 66,
by Edward B. McMillan. 24 Oct 66, 29p Rept. no. 624101
Contract N00014-66-C0156
Proj. NR-213-051

Descriptors: (*Radomes, Microwave frequency), Design, Millimeter waves, Metal plates, Sandwich panels, Dielectrics, Inductance, Phase control devices.

The objective was to find for radome design engineers an electrical approach which would permit more adequate environmental design for the microwave and especially the millimeter regions. To escape the structural dependence upon the thickness requirement of the customary phase delay design, phase advance possibilities were examined. This led to a study of the perforation of a structural metal plate for phase advance properties and sandwiching it between protective dielectric phase delay layers. The characteristics of an inductive two-dimensional lattice of very small circular holes were studied and selected as the most promising. It was concluded that while improved environmental adequacy would be inherent, workable design techniques could not be made ready until susceptance theory for holes in lattices was amplified, put in engineering form and test data reconciled with it. (Author)

AD-641 391 **Field 17I**
CFSTI Prices: HC$6.00 MF$1.25
Radio Corp. of America, Moorestown, N. J. Missile and Surface Radar Div.
OPTIMUM WAVEFORM STUDY FOR COHERENT PULSE DOPPLER.
Final rept.
28 Feb 65, 227p
Contract Nonr-4649 (00) (X)

Descriptors: (*Doppler radar, Waveform generators), Frequency modulation, Nonlinear systems.

The report contains the results of a theoretical investigation directed towards improving the sidelobe characteristics with respect to doppler of a swept frequency modulated signal. The methods of suppressing the time sidelobes analyzed were (a) Taylor frequency weighting in the receiver, (b) tone injection to predistort the phase of transmitted signal, (c) spectrum weighting by nonlinear FM of transmitted signal, (d) spectrum weighting by nonlinear FM in transmitter and frequency weighting in receiver, and (e) step-amplitude weighting in the transmitter. For each of the cases studied, where appreciable, normalized curves of the compressed signal time response are presented to illustrate the results. It has been found that nonlinear FM of the transmitted signal results in deterioration of the sidelobe performance with doppler due to phase mismatch in the receiver. A method that removes the effects of doppler on the received signal is frequency weighting of the transmitted signal. Step-amplitude modulation with a small number of steps is one method by which this weighting may be accomplished. (Author)

AD-641 430 **Field 17I**
CFSTI Prices: HC$3.00 MF$0.75
Institute for Defense Analysis, Arlington, Va. Research and Engineering Support Div.

RESOLUTION OF MULTIPLE TARGETS IN CLUTTER.
Research paper,
by Donald Richman. Jun 66, 87p RP-P-158, IDA/HQ-66-5086
Contract SD-50

Descriptors: (*Resolution, *Radar targets), (*Waveform generators, Resolution), Signal-to-noise ratio, Radar clutter.

The paper deals with the problem of waveform design for multiple target resolution. The objective of the paper is not to offer solutions but to illuminate boundaries of validity of present concepts and indicate areas where basic analytical tools--potentially available and necessary--do not exist as yet. (Author)

AD-641 446 **Field 17I, 15C**
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y.
PRELIMINARY STUDIES OF DETECTION TIME AND OTHER FACTORS INVOLVED IN AEW PERFORMANCE.
Technical rept.,
by Arthur Lefford. Aug 50, 39p
Contract N6onr-279 (03)
Projs. NR-784-006, SPECDEVCEN-20-F-4
SPECDEVCEN-279-3-4

Descriptors: (*Radar targets, Detection), (*Combat information centers, Analysis), (*Early warning systems, Airborne), Plan position indicators, Radar operators, Performance (Human), Frequency, Functional analysis.

The experiment deals with the effect of increasing the work load on the output of a single operator and PPI console. Work load was increased by increasing the number of targets on the scope face. The information obtained in the study is a necessary preliminary to the evaluation of the Cadillac III CIC system. A rationale for the evaluation of this system is presented. It was found that detection time for a new target was a positive exponential function of the number of targets on the scope face. When the number of reports made within a minute interval was considered as a function of the running time of the experiment, a cyclical relationship appeared; i.e., about 10 to 12 reports were made per minute. The number of plots made per unit time remained constant under varying loads. The average number of plots was found to be 5.26 per minute. (Author)

AD-641 452 **Field 17I, 15C**
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y.
FUNCTIONAL RELATIONSHIP OF TIME DENSITY TO THE DETECTION OF DISCRETE RADAR TARGET EVENTS.
Technical rept.,
by H. Wallace Sinaiko, Arthur Lefford, and Robert E. Taubman. Apr 51, 36p
Contract N6onr-279 (03)
Projs. NR-784-006, SPECDEVCEN-20-F-4
SPECDEVCEN-279-3-6

Descriptors: (*Radar targets, Detection), Time, Functional analysis, Probability, Radar operators, Combat information centers, Radar equipment, Frequency.

The purpose of the laboratory study was twofold: (a) To explore the functional relations between time density and the probability that a radar operator would detect several different kinds of scope events, and (b) To develop a 'difficulty index' for these different scope events which could be used in controlling input stimuli for further experimental study on the Cadillac III Combat Information Center system. (Time density is defined as the number of discrete target events occurring per unit time--the time unit used being one minute.) The effects of time density were systematically explored over the range one to five discrete targets events per minute. The functional relation between the probability of detecting discrete events and time density was demonstrated to be probability function. (Author)

AD-641 603 **Field 17I, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
HAYSTACK POINTING SYSTEM: RADAR COORDINATE CORRECTION.
Technical note,
by C. A. Clark. 24 Oct 66, 31p TN-1966-56
Contract AF 19 (628)-5167
Proj. 649
ESD-TR-66-551

Descriptors: (*Radar antennas, Steering), (*Radio telescopes, Steering), Errors, Corrections, Programming (Computers), Massachusetts, Space surveillance systems.

Identifiers: Haystack pointing system.

In the Haystack Pointing system, errors caused by atmospheric refraction, gravitational deformation of the antenna, skewed axes and resolver error are compensated for by a correction program in the computer which adds the necessary biases to the geometric values of azimuth and elevation to produce an effectively correct aiming of the antenna. (Author)

AD-641 640 **Field 17I, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
GENERAL-PURPOSE I/O CHANNEL AND INTERFACE FOR HAYSTACK 490 COMPUTER.
Technical note,
by J. E. Gillis, A. F. Dockrey, and S. B. Russell.
10 Oct 66, 28p TN-1966-40
Contract AF 19 (628)-5167
Proj. AF-649L
ESD-TR-66-454

Descriptors: (*Radio telescopes, Steering), (*Radar antennas, Steering), (*Digital computers, Control systems), Input-output devices, Radiometers, Analog-to-digital converters, Display systems, Massachusetts, Space surveillance systems.

Identifiers: Haystack pointing system.

A general-purpose interface has been constructed for Channel 5 of the Haystack Univac 490 digital computer. Data inputs are from the radiometer and a general-purpose A/D converter while outputs are a display of right ascension, declination, and hour angle, a CRT display and strip chart recorder, and control of the radiometer and other general-purpose functions. (Author)

AD-641 641 **Field 17I, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
HAYSTACK POINTING SYSTEM: DIGITAL EQUIPMENT ORGANIZATION.
Technical note,
by P. D. Smith. 10 Oct 66, 21p TN-1966-15
Contract AF 19 (628)-5167
Proj. AF-649L
ESD-TR-66-452

Descriptors: (*Radio telescopes, Steering), (*Radar antennas, Steering), Digital systems, Digital computers, Input-output devices, Control systems, Massachusetts, Space surveillance systems.

Identifiers: Haystack pointing system.

The report describes the operation and organization of the digital equipment associated with the Univac 490 pointing computer at Haystack. All of the input/output equipment connected to the U490 is discussed with the major emphasis being placed on that equipment associated with pointing the antenna. (Author)

AD-641 705 **Field 17I, 20N**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
A COMPARISON OF THREE METHODS FOR THE CORRECTION OF RADAR ELEVATION ANGLE REFRACTION ERRORS,
by B. D. Hinds, and R. G. Pappas. Aug 66, 31p
Task DA-1P620901A199-05
ECOM-5071

Descriptors: (*Radar signals, Refraction), Corrections, Errors, Microwaves, Propagation, Meteorological parameters, Refractive index.

The atmospheric effects on microwave radiation were investigated by using a ground based radar and a fixed beacon combination at White Sands Missile Range, New Mexico. With this radar-beacon combination, the approximate range and elevation angle between the two sites were 45 miles and 1 degree respectively. This investigation compares three methods for correcting the radar elevation angle error caused by the atmosphere. One method uses the measured meteorological parameters sampled by radiosonde instruments while the second and third methods utilize an exponential vertical structure fixed by a measured surface refractive index value. (Author)

AD-641 961 **Field 17I**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
DUPLEXER FOR A RADAR SYSTEM USING A DUAL-MODE TRANSMITTER TUBE.
Technical rept.,
by William H. Wright, Jr. Sep 66, 17p ECOM-2765
Proj. DA-1E6-22001-A-055
Task 1E6-22001-A-055-04-21

Descriptors: (*Radar duplexers, Microwave oscillators), Triodes, Limiters, Mixer tubes, Radar equipment, Portable.

The unique problems of the design of the duplexer for a radar system are discussed using a microwave triode oscillator to perform both the transmitter and local oscillator functions of a radar with the same tube. A novel duplexer design approach is proposed, which will result in effective duplexer performance in a small, reliable, and inexpensive package. (Author)

AD-80 638 **Field 17I, 12A**
CFSTI Price: HC$4.60
RAND Corp., Santa Monica, Calif.
PROBABILITY OF DETECTION FOR FLUCTUATING TARGETS.
Research memo.,
by P. Swerling. 17 Mar 54, 42p RM-1217

Descriptors: (*Radar targets, Detection), (*Probability, *Detection), Search radar, Target acquisition.

The report considers the probability of detection of a target by a pulsed search radar, when the target has a fluctuating cross section. Formulas for detection probability are derived, and curves of detection probability vs. range are given, for four different target fluctuation models. The investigation shows that, for these fluctuation models, the probability of detection for a fluctuating target is less than that for a non-fluctuating target if the range is sufficiently short, and is greater if the range is sufficiently long. The amount by which the fluctuating and non-fluctuating cases differ depends on the rapidity of fluctuation and on the statistical distribution of the fluctuations. A comparison was made of the non-fluctuating case and the four fluctuating cases considered. (Author)

AD-85 427 Field 17I
CFSTI Price: HC$3.60
RAND Corp., Santa Monica, Calif.
DETECTION RANGE OF AN ACTIVE RADAR SEEKER,
by J. D. Mallett, and P. Swerling. 20 Apr 54, 38p RM-1238
Contracts AF 49 (638)-700, AF 33 (038)-6413

Descriptors: (*Homing devices, *Radar homing), (*Radar targets, *Detection), Ranges (Distance).

The report analyzes the effect of various factors on the detection range of an active radar seeker. The factors considered include those which define the performance of a seeker, such as size of the search pattern, range and angular resolution, range of possible target velocities (with respect to the seeker), target closing velocity, target echoing area, false alarm time, and probability of detection; and constants describing the seeker such as average transmitted power, wavelength, dish size, pulse repetition rate, pulse width, scan time, i-f and a-f bandwidth, and number or range gates and velocity channels. Equations and curves are developed to show the variation of detection range with the above-mentioned parameters, and to aid in making optimum choice of scan time. (Author)

N66-32761 Field 17I
CFSTI Prices HC$2.50 MF$0.50
Kansas Univ., Lawrence. Engineering Science Div.
RADAR AS A REMOTE SENSOR.
by R. K. Moore. 13 Jan 66, 56p NASA-CR-76890, CRES-61-7
Contract NSR-17-004-003

Descriptors: *Imaging technique, *Parabolic velocity, *Radar system, *Range measurement, Azimuth, Illumination, Image, Measurement, Microwave, Parabolic, Radar, Radius, Range, Sensor, System, Technique, Velocity.

For abstract, see STAR 04 19.

N66-33984 Field 17I
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
RANGE RESIDUALS IN VHF RADAR TRACKING.
by B. Rosenbaum. Aug 66, 19p NASA-TN-D-3560

Descriptors: *Ionospheric irregularity, *Radar tracking, *Very high frequency, Computation, Data, Frequency, Ionosphere, Irregularity, Noise, Radar, Range, Rate, Residual, Tracking, Very high.

For abstract, see STAR 04 19.

N66-38707 Field 17I
CFSTI Prices HC$3.00 MF$0.75
Philco Corp., Palo Alto, Calif. Wdl Div.
EARTH-BASED TRACKING OF A LUNAR BEACON.
19 Aug 66, 68p NASA-CR-78512, WDL-TR3007
Contract NAS5-9939

Descriptors: *Computer program, *Lunar tracking, *Manual, Accuracy, Beacon, Bias, Computer, Digital, Earth, Error, Location, Moon, Program, Random, Station, Tracking.

For abstract, see STAR 04 23.

AD-482 811 See Field 3B

AD-641 328 See Field 9A

AD-641 450 See Field 5E

AD-641 692 See Field 4B

17J. SEISMIC DETECTION

AD-641 717 Field 17J, 8K
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
GEOSCIENCES AND TECHNOLOGY BULLETIN, VOLUME 1, NO. 1.
Oct 66, 34p
TT-66-62586

Descriptors: (*Nuclear explosions, Detection), (*Seismology, Periodicals), Underground explosions, USSR, Seismological stations, Seismic waves, Earthquakes, Data, Structural geology, Propagation, Rock (Geology), Drilling, Stratigraphy.

Contents: Records of earthquakes; Seismic area characteristics; Structural and stratigraphic characteristics; Seismic modeling; Properties of rocks and seismic wave velocities; Seismic wave propagation; Seismic prospecting; Detection of seismic events; Deep drilling; Miscellaneous.

AD-641 906 See Field 8K

AD-642 002 See Field 8K

18. NUCLEAR SCIENCE AND TECHNOLOGY

PB-173 472 Field 18
CFSTI Prices: HC$12.60 MF$0.75
Institutt for Atomenergi, Kjeller (Norway).
SURVEY OF ACTIVITIES 1965,
by Bjarne Aabakken. Feb 66, 121p KR-109

Descriptors: (*Nuclear physics laboratories, Reviews), (*Nuclear reactors, *Norway), Marine nuclear propulsion, Power reactors, Reactor kinetics, Computers, Heavy water reactors, Research reactors, Reactor fuel processing, Radioactive wastes, Radiochemistry, Reactor fuels, Corrosion, Isotope separation, Reactor safety, Health physics.

Work undertaken in 1965 in Kjeller is summarized: Topics include: reactor studies and development (marine project, power reactors, engineering development, reactor dynamics, reactor physics, computers); reactors (JEEP, NORA, JEEP II); neutron physics; chemistry (reprocessing pilot plant, reprocessing analysis, radiochemistry, waste treatment plant, reactor chemistry, analysis); metallurgy (UO2-work, fuel element development and fabrication, corrosion); isotope production and development; Netherlands' - Norwegian Reactor School; safety work (reactor safety, safety evaluation of the marine project, safety in handling of radioactive materials, control with fissionable materials); health physics (personnel monitoring, environmental monitoring).

18A. FUSION DEVICES (THERMONUCLEAR)

PB-173 386 See Field 20I

PB-173 392 See Field 20I

18B. ISOTOPES

AD-43 734 Field 18B
CFSTI Price: HC$1.60
Colorado Univ., Boulder. Engineering Experiment Station.
SEPARATION OF ISOTOPES BY ELECTROLYSIS,
by F. A. Rohrman, William J. Utlaut, and Ivan Ceresna. 13 Sep 54, 17p
Contract AF 18 (600)-440
AFOSR-TR-54-27

Descriptors: (*Isotope separation, *Electrolysis), Silver, Cadmium, Zinc, Tin.

Continued research on nickel-nickel 63 electrolysis and plating tests showed by counting techniques that some separation of the isotopes was being effected. The condition which seemed to favor the separation of the heavier isotopes of nickel was a low current density which further indicated that the nickel 63 responded more like a metal lower in the electromotive table of the elements. Attempts at separating silver 110 and silver 111 from natural silver were unsuccessful. Attempts at separating any of the isotopes of uranium were unsuccessful. Further work on cadmium separation was indicated. The need of mass spectrometer capable of handling the heavier elements would be very desirable in this research. (Author)

AD-641 463 See Field 20H

18C. NUCLEAR EXPLOSIONS

AD-236 207 Field 18C, 18H
CFSTI Price: HC$5.60
Naval Radiological Defense Lab., San Francisco, Calif.
THE NRDL DYNAMIC MODEL FOR FALLOUT FROM LAND SURFACE NUCLEAR BURSTS.
Research and development technical rept.,
by A. D. Anderson. 5 Apr 60, 57p USNRDL-TR-410

Descriptors: (*Nuclear explosions, Radioactive fallout), (*Radioactive fallout, Mathematical models), Dose rate, Theory.

A fallout-computation method should be based on all the dynamics of the fallout process, but current computation models do not provide more than generalized answers because they do not account for early-time dynamics. In the attempt to account for the entire process, a theory for close-in fallout was originated. This theory was checked by developing from it a mathematical fallout model for land-surface bursts (the D model) and then using this model to compute fallout dose-rate patterns for two low-yield nuclear tests in Nevada. From a comparison of these patterns with the measured test patterns, it is concluded that the theory, as embodied in the D model, is sound, at least for low-yield land-surface bursts. Also, preliminary results indicate that the theory can be used to give accurate computations for bursts in the moderate and high-yield ranges. (Author)

AD-463 240 Field 18C, 18D, 9F
CFSTI Price: HC$4.00
Saint Louis Univ., Mo. Dept. of Physics.
ANALYSIS OF ARGUS/EXPLORER IV RECORDS.
Final rept., 1 Apr 63-15 Jan 65,
by A. H. Weber, R. M. Delaney, J. Fennell, J. A. George, and D. J. Manson. 15 Jan 65, 145p
Contract DA-49-145-XZ-145
DASA-1613

Descriptors: (*Nuclear explosions, Radiation measurement systems), (*Telemetering data, radiation measurement systems), (*Radiation measurement systems, Nuclear explosions), Detectors, Detection, Scintillation counters, Scientific satellites, Instrumentation, Terrestrial magnetism, Gamma counters, Photons, Electrons, Bremsstrahlung, Particles, Integral equations, Mathematical analysis, Atmosphere.

Identifiers: Explorer, Argus project.

An analysis is presented of the large amount of geomagnetically trapped particle radiation (due to both natural and argus injection) data obtained

by explorer IV, satellite 1958 epsilon, during July - September 1958. A previous report (Lundquist, Naumann, and Weber, J. Geophys, Res. 67, 4125 (1962-)) presented an analysis of the naturally trapped radiation as detected by the directional scintillation counter (Detector A, Channel 2) on board the satellite. This work was centered on argus type trapping and was intended to supplement the previous report. The objectives were to apply analysis similar to that employed for the naturally trapped particles to the directional argus trapped particles and also to attempt further analysis of the omnidirectional penetrating radiations, both for natural and argus trapping, using the data obtained by the G-M detectors (Detectors C and D, Channels 3 and 1). The report develops these objectives and presents all results so far obtained. (Author)

AD-641 481 **Field 18C, 4A, 20M**
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
TRANSMISSIVITY OF THE ATMOSPHERE FOR THERMAL RADIATION FROM NUCLEAR WEAPONS.
by M. G. Gibbons. 12 Aug 66, 47p USNRDL-TR-1060

Descriptors: (*Thermal radiation, Nuclear explosions), (*Atmosphere, Heat transfer), Cloud cover, Diffusion, Nuclear weapons.

The transmissivity of the atmosphere is estimated for thermal radiation from a nuclear weapon of any given yield and height of burst under various atmospheric conditions. Situations in which the effective source height (for thermal radiation) is less than one-quarter mile, the atmosphere is unclouded and the surface of the earth (or its covering) is of low albedo are considered first. The transmissivity for these situations is given in terms of a formula derived from earlier experiments of the author. Situations in which the effective source height (for thermal radiation) is equal to or greater than one-quarter mile are then considered, and basic transmissivity values are given in terms of effective fireball height and zenith angle for the case of an unclouded atmosphere, a visibility of about 12 miles and a low surface albedo. Factors are then given for modifying the basic transmissivity values to apply to other situations, such as ones with cloud cover or haze, and for taking into account high surface albedo. The factors for taking account of a cloud layer above the fireball and/or a high surface albedo are found to apply also to situations in which the effective fireball height is less than one-quarter mile. (Author)

AD-641 311 **See Field 8M**

18D. NUCLEAR INSTRUMENTATION

AD-641 559 **Field 18D**
CFSTI Prices: HC$2.00 MF$0.50
Army Nuclear Defense Lab., Edgewood Arsenal, Md.
EVALUATION OF THE RESPONSE OF SILICON DIODE DOSIMETERS TO FAST NEUTRONS,
by Eloy P. Vega, David T. Kilminster, and John H. McNeilly. Oct 66, 40p NDL-TM-31
Proj. RD-31-50/06.514T

Descriptors: (*Semiconductor devices, Dosimeters), (*Dosimeters, Operation), (*Fast neutrons, Dosimeters), Neutron detectors, Diodes (Semiconductor), Sensitivity, Relaxation time, Voltage, Silicon.

Conductivity-modulated, silicon p-n junctions of two base widths (10- and 50-mil) were exposed to a burst of fast neutrons. High-level lifetime, reverse-recovery lifetime, and forward voltage at four constant current levels were correlated with fast neutron kerma as measured by threshold detectors. This correlation showed that the sensitivity of the diodes varied with respect to kerma. The curves of high-level lifetime versus kerma and reverse-recovery lifetime versus kerma have two changes in slope, at 100000 ergs/g and at 1000000 ergs/g. The 10-mil diodes exhibited excellent reproducibility for both lifetime measurements; however, only 55 percent of the forward-voltage measurements were within plus or minus 10 percent of the average. The lifetime measurements of the 50-mil diodes were very poor (only 31 percent of the data was within plus or minus 10 percent) while the forward-voltage measurements were better (84 percent of the data was within plus or minus 10 percent). (Author)

AD-641 843 **Field 18D**
CFSTI Prices: HC$2.00 MF$0.50
Phylatron Corp., Columbus, Ohio.
SILICON DIODE FAST NEUTRON DOSIMETER, PHASE I, EVALUATION OF RESPONSE VERSUS STARTING MATERIAL,
by J. M. Swartz, B. H. Chase, and O. M. Thurston. Oct 66, 39p
Contract DA-18-035-AMC-101 (A)
NDL-TR-83-1

Descriptors: (*Dosimeters, *Diodes (Semiconductor)), (*Semiconductor devices, *Neutron counters), Silicon, Resistance (Electrical), Crystal growth, Relaxation time, Annealing, Radiation damage, Doping.

The report presents the results obtained from an investigation of the effects of (n- or p-type) silicon, resistivity, and method of crystal fabrication (pulled or float-zone) on the response of silicon-diode fast-neutron dosimeters. The high-level lifetime, the reverse-recovery lifetime, and the current-voltage characteristic were measured for diodes fabricated from each type of starting material, and these parameters were then followed as the diodes were exposed to various neutron fluences. Preliminary results of isochronal annealing experiments and the effects of maintaining the diodes at low temperatures during irradiation are also presented. It was expected that the high-level damage constant, derived from the high-level lifetime, would be independent of the resistivity of the starting material, and this was demonstrated experimentally. Annealing results suggest that at least seven levels are involved in the degradation of lifetime by fast neutrons, and studies of devices irradiated at 77K and 273K revealed an increased amount of observed damage. (Author)

AD-641 913 **Field 18D**
CFSTI Prices: HC$4.00 MF$0.75
Solid State Radiations, Inc., Los Angeles, Calif.
FLUOR-PHOTODIODE GAMMA RAY DOSIMETER.
Final rept.,
by M. R. Zatsick, H. S. Katzenstein, J. Friederichs, R. Higa, and J. Underwood. 21 Sep 65, 113p
SSR-1F2704-65
Contract N228 (62497)68124
USNRDL-TRC-78

Descriptors: (*Dosimeters, *Diodes (Semiconductor)), (*Semiconductor devices, Dosimeters), Photoelectric cells (Semiconductor), Sensitivity, Radiation monitors, Gamma counters, Neutron counters, Design, Construction, Calibration, Circuits.

A fluor-photodiode gamma ray dosimeter, nicknamed 'Fluorad,' was designed, fabricated, and extensively tested and calibrated. The instrument (sensor head plus recycling circuit) provides output pulses suitable for low sensitivity scaler inputs. The total count (x 10) corresponds to the integrated absorbed dose of a given gamma ray exposure in incremental steps of 10 rads (air) per count. The dosimeter is capable of monitoring both steady state or pulsed radiation fields over an intermediate dose rate range of 10 - 100,000 rads/sec. Energy calibration, using side-by-side dosimetry techniques, was carried out over the range 50 keV to 11 MeV. Various types of ion chambers and thermoluminescent dosimeters were used as the calibrating standards. The measured energy response relative to Co60 over the photon energy range, 100 keV to 10 MeV, was virtually constant. An average absolute sensitivity of 1.5 x 10 to the -8th power C/rad was observed. The measured neutron response at 14 MeV was equal to 0.5 times the first collision dose in standard tissue. Other characteristics measured included: pulsed reactor fission neutron and gamma ray response, linearity of frequency vs. dose rate (or current), directional response, temperature range, saturation and recovery time, spurious pulse rate, and radiation effects. The variations in reproducibility for fixed conditions was less than plus or minus 1%. (Author)

AD-641 928 **Field 18D, 6L**
Not available from CFSTI.
Defence Chemical Biological and Radiation Labs., Ottawa (Ontario).
EFFECT OF DIFFUSION ON THE SATURATION CURVE OF A PLANE PARALLEL ION CHAMBER,
by P. A. Tate. 20 May 66, 12p DCBRL-502
Availability: Published in Phys. Med. Biol. v11 n4 p521-32 1966.

Descriptors: (*Ionization chambers, Diffusion), Electric fields, Equations, Numerical analysis, Differential equations, Canada.

Equations which include diffusion effects are derived for the electric field in an irradiated ion chamber. Numerical solutions are obtained by machine computer for degrees of saturation from 0.2 to 0.93. These solutions enable calculations to be made which agree closely with the experimental results of Shevyrev. An analytical expression is derived for the degree of saturation when recombination and space charge are negligible. The formula of Rossi and Staub may be interpreted as a limiting case of this expression. (Author)

N66-32698 **Field 18D**
CFSTI Prices HC$2.00 MF$0.50
Eon Corp., Brooklyn, N. Y. Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
STUDY AND DEVELOPMENT OF THE STERILIZABLE GEIGER- MULLER TUBE FINAL REPORT.
by G. R. Weinberg. Apr 66, 44p NASA-CR-76644
Contracts NAS7-100, JPL-951240
Prepared For Jpl

Descriptors: *Cathode ray tube, *Protective coating, *Sterilization, Cathode, Coating, Counter, Development, Electronics, Engineering, Geiger-mueller counter, Halogen, Metal, Plating, Protection, Ray, Resistance, Surface, Tube.

For abstract, see STAR 04 19.

N66-33135 **Field 18D**
CFSTI Prices HC$7.10 MF$2.25
International Atomic Energy Agency, Vienna (Austria).
NEUTRON DETECTORS.
May 66, 411p
Its Bibliog. Ser. No. 18

Descriptors: *Abstract, *Bibliography, *Neutron detector, Activation, Calibration, Counter, Detector, Dosimetry, Helium, Neutron, Scintillation, Source, Spectrometry, Technique.

For abstract, see STAR 04 19.

N66-38351 **Field 18D**
CFSTI Prices HC$1.00 MF$0.50
Japan Atomic Energy Research Inst., Tokyo. Reactor Physics Div.

EFFECTIVE CADMIUM CUTOFF ENERGY FOR CYLINDRICAL DETECTORS WITH CYLINDRICAL FILTERS.
by K. Inoue, and R. Takeda. 1964, 16p JAERI-1052
In Japanese And English, Summary

Descriptors: *Cadmium, *Cut-off, *Detector, *Neutron flux, Atom, Beam, Carbon, Change, Cylinder, Deuteron, Energy, Filter, Free, Gas, Homogeneity, Isotropism, Medium, Model, Position, Research, Slab.

For abstract, see STAR 04 23.

N66-38713 **Field 18D**
CFSTI Prices HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
TEMPERATURE DEPENDENCE OF THE RESPONSE OF LITHIUM-DRIFTED GERMANIUM DETECTORS TO GAMMA RAYS.
by M. M. El-shishini, and W. Zobel. Sep 66, 75p NASA-CR-78465, ORNL-TM-1295
Contract NASA ORDER R-104/1/, W-7405-ENG-26
Sponsored In Part By Nasa

Descriptors: *Detector, *Gamma radiation, *Germanium, Capacitance, Diode, Drift, Efficiency, Energy, Gamma, Leakage, Lithium, Radiation, Ray, Resolution, Response, Source, Temperature.

For abstract, see STAR 04 23.

PB-173 388 **Field 18D**
CFSTI Prices: HC$5.00 MF$1.00
Commissariat a l'Energie Atomique, Saclay (France), Centre d'Etudes Nucleaires.
CONTRIBUTION A LA MESURE PRECISE DE L'ACTIVITE DE SOURCES NON PONCTUELLES AU MOYEN DE LA CHAMBRE D'IONISATION A PUITS (Contribution to the Precise Measurement of the Activity of Non-Point Sources by the Use of the Well-Type Ionisation Chamber),
by Jean Dalmazzone. Oct 66, 151p CEA-R-3071
Text in French; attached summary in English.

Descriptors: (*Ionization chambers, Sensitivity), (*Gamma counters, Ionization chambers), (*Beta particles, Ionization chambers), Radioactive isotopes, Gamma emission, Beta decay, Measurement, Bremsstralung, Geometric forms, Photons, Radioactivity, France.

The well-type ionisation chamber is commonly used to measure Beta, Gamma and Beta-Gamma sources (the first by making use of Bremsstrahlung) over a wide activity range. The volume of these sources can be appreciable owing to the existence of large 'zones of equal sensitivity' verified by means of a Ra point source. The concept of zones of equal sensitivity depends not only on the geometry of the chamber but also on that of the source and on the energy of the photons (X or Gamma) emitted by it. A systematic study was thus made of the importance of the source geometry in activity measurements with the well- type chamber, for 18 Beta, Gamma or Beta-Gamma emitting radionucleides. (Author)

AD-463 240 **See Field 18C**

PB-173 397 **See Field 14B**

PB-173 496 **See Field 8M**

18F. RADIATION SHIELDING AND PROTECTION

N66-33723 **Field 18F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
USE OF THE METHOD OF "REMOVAL CROSS SECTION" FOR THE COMPUTATION OF SHIELDING NOT CONTAINING HYDROGEN.
Primeneniye Metodiki "secheniy Vyvedeniya" Dlya Rascheta Zashchity, Ne Soderzhashchey Vodorod
by D. L. Broder, V. V. Frolov, A. A. Kutuzov, and V. V. Levin. May 66, 15p NASA-TT-F-10155
Transl. Into English From The Book "fiziki Zashchity Reaktorov" Moscow, Gosatomizdat, 1963 P 52-60

Descriptors: *Hydrogen, *Neutron cross section, *Nuclear shielding, Absorption, Aluminum, Boron, Carbide, Cross section, Iron, Moderator, Neutron, Nuclear, Removal, Shielding, Thorium, Uranium 235.

For abstract, see STAR 04 19.

PB-173 478 **Field 18F**
CFSTI Prices: HC$3.00 MF$0.75
Kjeller Research Establishment (Norway). Institutt for Atomenergi.
MAGNA, A MULTI-SOURCE GAMMA SHIELDING PROGRAMME,
by Ulf Tveten. Jun 66, 69p KR-111

Descriptors: (*Gamma rays, Dose rate), (*Shielding, *Programming (Computers)), Attenuation, Geometric forms, Gamma emission, Norway.

Identifiers: MAGNA program.

MAGNA is a gamma computer programme written in FORTRAN 3600 for a CDC 3600 computer. It calculates gamma dose rates in chosen points in or around a set of gamma sources and shields. The sources must be point sources or cylindrical sources, but there are no restrictions to position and orientation. The shields may be cylindrical, cylindrical shell, finite rectangular slab, or infinite slab, and there are very liberal rules to the way the components may be placed. The programme was developed as a component shield code and is very useful as such. Shadow-shielding and self-shielding effects are included in the computations. (Author)

AD-641 664 **See Field 13J**

18G. RADIOACTIVE WASTES

N66-38087 **Field 18G, 11C**
CFSTI Prices HC$2.00 MF$0.50
Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.
RECENT STUDIES ON PYROLYTIC CARBON COATINGS ON FUEL PARTICLES.
by B. Chinaglia, G. Cocito, M. Domenici, A. Drago, and H. Walther. 1966, 45p SORIN-86
Presented At The Dragon Contractors Res. And Develop. Symp., Harwell, England, Mar. 1966 Its Preprint Of Dp Rept.- 422

Descriptors: *Carbon, *Coating, *Fission product, *Pyrolytic material, Cool, Empirical, Equation, Fission, Gas, Improvement, Product, Quality, Rate, Reactor, Release, Retention, State, Steady.

For abstract, see STAR 04 23.

PB-173 389 **Field 18G, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CONTRIBUTION A L'ETUDE DE LA DESORPTION DES GAZ DE FISSION FORMES DANS L'OXYDE D'URANIUM IRRADIE (Contribution to the Study of the Desorption of Fission Gases Formed in Irradiated Uranium Oxide),
by Jean-Louis Berry, Raymond Darras, and Bernard Roger. Sep 66, 28p CEA-R-3021
Text in French; Attached Summary in English.

Descriptors: (*Reactor fuels, Fission products), (*Uranium compounds, Fission products), (*Fission products, *Xenon), Dioxides, Radiation damage, Diffusion, Neutron flux, Heat of activation, Density, Evaporation, France.

Identifiers: Uranous oxide, Desorption.

The release of xenon-133 from irradiated uranium dioxide was studied in the temperature range 1300-1900C, using various monocrystalline or sintered samples. Up to 1600C, this release is proportional to the square root of the time and thus occurs essentially by diffusion. The apparent diffusion constant D' decreases and the activation energy of the corresponding process increases as the integrated neutron flux received by the fuel increases. As the density of the sintered samples decreases however, the activation energy of the release also decreases, so that the difference between D' values for sintered samples of different densities decreases as the temperature rises. Finally, above 1600C, the fission gas release phenomenon is governed by UO2 evaporation, and all the different types of oxide studied have similar behaviours, characterized by poor retention of these gases. (Author)

18H. RADIOACTIVITY

AD-641 480 **Field 18H, 15C, 13L**
CFSTI Prices: HC$4.00 MF$0.75
Naval Radiological Defense Lab., San Diego, Calif.
REMOVAL OF SIMULATED FALLOUT FROM ASPHALT STREETS BY FIREHOSING TECHNIQUES,
by L. L. Wiltshire, and W. L. Owen. 29 Jul 65, 106p USNRDL-TR-1049

Descriptors: (*Decontamination, Roads), (*Radioactive fallout, Decontamination), (*Fire extinguishers, Decontamination), Particle size, Asphalt, Reclamation, Nuclear explosions, Simulation, Effectiveness, Performance (Engineering), Graphics, Radioactivity.

The report evaluates firehosing as a wet reclamation procedure for the operational recovery of asphalt paved streets contaminated with fallout from a land surface nuclear detonation. Preliminary tests with inert fallout simulant determined the optimum nozzle stream range and firehosing technique. Principal tests, conducted with radio-traced simulants, measured the effects of hosing rate, stream pattern, particle size and mass loading on the fallout removal performance of firehosing. Several conclusions were indicated: (1) A slow hosing rate (visually controlled) was more effective than a faster rate, regardless of mass loading or particle size range. (2) The removal effectiveness improved with increased particle size range and increased mass loading. (3) An experimental NRDL 'flare' nozzle appeared to improve hosing performance at nozzle pressures greater than 150 psi. Graphs showing the effect of hosing rate, particle size, mass loading and stream pattern on the reclamation performance of firehosing are presented. (Author)

AD-641 725 **Field 18H**
CFSTI Prices: HC$4.00 MF$1.00
General Dynamics Corp., San Diego, Calif. General Atomic Div.
OPTICAL STUDIES OF RADIATION DAMAGE PROCESSES.
Final scientific rept., 25 Mar 63-24 Mar 66,
by D. M. J. Compton. 24 Apr 66, 128p GA-7140
Contract AF 19 (628)-2926
Proj. AF-4608
Task 460801
AFCRL-66-427

Descriptors: (*Radiation damage, Optical analysis), Electron accelerators, Optical

properties, Electron spin resonance, Excitation, Ruby, Gallium alloys, Arsenic alloys, Solid solutions, Color centers, Silicon, Photoconductivity.

The program used the high dose rate available from an electron linear accelerator to study radiation damage and excitation-de-excitation processes on a fast time scale. Fast optical techniques were used to study the processes occurring, and apparatus and methods were developed for measuring optical absorption and emission at nanosecond speeds. Progress was also made towards the application of high-speed electron spin resonance to these problems. These techniques were applied to a study of de-excitation, from the energy deposited by an electron pulse in ruby and in GaAs, and also to the kinetics of radiation damage in GaAs. In the alkali halides, absorption techniques were used to study the introduction and annealing of F centers; and the trapping of radiation produced electrons to form F centers. Fast optical techniques proved to give an important increase in the understanding of these processes, and are also useful in understanding radiation-induced conductivity in insulators. Optical absorption and photoconductivity measurements were made to study the kinetics of complex defect center formation in silicon: this work is still in a preliminary stage. (Author)

AD-641 746 **Field 18H, 20H**
CFSTI Prices: HC$2.00 MF$0.50
Instituto de Investigacion Aeronautica y Espacial, Buenos Aires (Argentina). Laboratorio de Radiaciones.
DISINTEGRATION OF Sn113,
by H. E. Bosch, M. C. Simon, E. Szichman, L. Gatto, and S. M. Abecasis.Jul 66, 31p LR-10
Grant DA-ARO-49-092-65-G78
Proj. DA-20014501B11B-00-005-LA

Descriptors: (*Tin, *Radioactive decay), Electron capture, X rays, Gamma emission, Nuclear energy levels, Bremsstrahlung, Nuclear models, Decay schemes, Gamma-ray spectra, Internal conversion, Indium, Radioactive isotopes, Argentina.

A reinvestigation of the decay of 119-d tin-113 was carried out with scintillation as well as with lithium-drifted silicon- and germanium-detectors. In addition to X rays, two gamma rays of 0.2555 plus or minus 0.0005 and 0.3910 plus or minus 0.0005 MeV were found in relative intensity (2.9 plus or minus 0.3)x0.01. The K-conversion coefficient of the 0.2555-MeV transition was measured to be 0.042 plus or minus 0.010 and that of the 0.3910-MeV one, 0.49 plus or minus 0.04 (K/L.M= 4.2 plus or minus 0.4). The electron-capture ratio P sub EC (L.M...)/P sub EC (K) to the 0.6465-MeV level of indium-113 was determined to be 0.36 plus or minus 0.20. The bremsstrahlung end-point energy to the same level was (0.080 plus or minus 0.005) MeV. From these values the decay-energy transitions to that level was deduced to be 0.050-0.170 MeV and (0.110 plus or minus 0.005) MeV, respectively. A decay scheme is constructed and reasonable shell-model as well as microscopic models assignments are made to all levels. (Author)

AD-641 765 **Field 18H, 20H, 14B**
Not available from CFSTI.
Washington Univ., Seattle.
F MEASUREMENTS WITH BLACK ABSORBERS,
by J. G. Dash. 1965, 10p
Grant AF-AFOSR-594-64
Proj. AF-9763
Task 976303
AFOSR-66-1605
Availability: Published in Mossbauer Effect Methodology v1 p107-14 1965.

Descriptors: (*Mossbauer effect, Measurement), Line spectrum, Gamma emission, Absorption, Recoil atoms, Copper, Radioactive decay.

A discussion is given of a technique for the measurement the Mossbauer fraction (F) of gamma radiation intensity which employs an absorber which is opaque to the Mossbauer line but transparent to the recoil radiation.

N66-37780 **Field 18H, 18J, 11F**
CFSTI Prices HC$2.00 MF$0.50
Reactor Group, United Kingdom Atomic Energy Authority, Culcheth (England).
IRRADIATION DAMAGE IN MILD STEEL. A COMPARISON OF CRACK ARREST TEST AND CHARPY CRITERIA AND THE INFLUENCE OF NEUTRON SPECTRUM.
by A. Cowan, G. D. Fearnehough, J. Gillies, and G. M. Lees. 1966, 40p TRG-1069/C/

Descriptors: *Neutron spectrum, *Nuclear reactor material, *Radiation effect, Charpy impact test, Crack, Damage, Irradiation, Mild, Pressure, Steel, Test, Vessel.

For abstract, see STAR 04 23.

AD-236 207 **See Field 18C**

AD-641 406 **See Field 9A**

AD-641 533 **See Field 20H**

AD-641 673 **See Field 9E**

PB-173 400 **See Field 20L**

PB-173 401 **See Field 20H**

18I. REACTOR ENGINEERING AND OPERATION

EGG-1183-1210 **Field 18I, 17B, 13L**
CFSTI Prices: HC$5.00 MF$1.00
Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
TELEVISION SYSTEM STUDY FOR NUCLEAR ACCIDENT RECOVERY. PHASE I,
by N. A. Talpis, and D. L. Burge. Apr 66, 181p IDO-10047

Descriptors: (*Television equipment, *Nuclear explosions), (*Reactor accidents, Recovery), Safety.

A previous study of equipment necessary for clean-up following a nuclear accident indicated a need for a portable television system capable of operating in hazardous environments during recovery operations. A system to accomplish this is described and justified in this study. Four television cameras will be used for coverage, with three radiation-tolerant and environmental-resistant cameras to be used in and around the source, and one standard environmental-resistant camera to be used for general area surveillance. All cameras will be controlled at a remote control monitor console located up to 2100 feet from the cameras. Further separation from the camera control units of from five to ten miles is possible through the use of lightweight, portable, one-way microwave systems. The standard camera may be used, handheld, aboard airborne platforms and linked to the monitors by microwave. An intercom system will provide communications between wire-connected cameras and control area. Monitor viewing is provided for use at the camera, if necessary, and at the control area. A three-dimensional viewing adapter will permit the utilization of two radiation-tolerant cameras in a configuration that will provide a depth perception viewing capability. A video and audio tape recorder, plus still and motion picture cameras will be available for recording of scenes and intercom channel for real-time viewing or data storage. A vehicle is proposed to allow remote camera positioning from the control area, thereby eliminating the need for personnel in the hazardous environment. Design criteria, final system design and equipment lists are included. (Author)

N66-33973 **Field 18I**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
HEAT-TRANSFER ANALYSIS OF THE PLUM BROOK REACTOR.
by S. Altomare, K. J. Baumeister, and H. J. Reilly. Aug 66, 36p NASA-TN-D-3552

Descriptors: *Heat flux, *Heat transfer, *Nucleate boiling, *Plum brook reactor, *Reactor core, Analysis, Boiling, Coolant, Core, Departure, Flux, Fuel, Full, Heat, Nucleate, Operation, Plate, Power, Pump, Ratio, Reactor, State, Steady, Surface, Surface temperature, Temperature.

For abstract, see STAR 04 19.

N66-37781 **Field 18I, 18J, 13H**
CFSTI Prices HC$2.00 MF$0.50
Reactor Group, United Kingdom Atomic Energy Authority, Culcheth (England).
IMPLICATIONS OF EMBRITTLEMENT DURING THE LIFE OF A ZIRCONIUM PRESSURE TUBE REACTOR.
by R. W. Nichols, and B. Watkins. 1966, 28p TRG-1252/C/

Descriptors: *Embrittlement, *Heavy water components test reactor (hwctr), *Pressure tube, Crack, Defect, Failure, Irradiation, Life, Nuclear, Reactor, Stress, Technology, Test, Zirconium.

For abstract, see STAR 04 23.

N66-38120 **See Field 18J**

18J. REACTOR MATERIALS

AD-433 152 **Field 18J**
CFSTI Price: HC$1.60
Naval Research Lab., Washington, D. C.
EFFECTS OF NEUTRON IRRADIATION ON THE PROPERTIES OF REACTOR STRUCTURAL MATERIALS.
Annual summary rept.,
by L. E. Steele, and J. R. Hawthorne. 20 Jan 64, 19p NRL-0858
Proj. SR-007-01-01

Descriptors: (*Nuclear reactors, Structural parts), (*Structural parts, radiation damage), Neutron detectors, Dosimeters, Radioactive isotopes, Manganese, Iron, Reactor system components, Pressure vessels, Steel, Brittleness, Ductility, Transition temperature, Heat treatment, Performance (Engineering).

Significant accomplishments in the calendar year 1963 for four areas of research are summarized. These include: (1) the determination of high energy neutron exposure to reactor pressure vessels utilizing the MN (54) isotope analysis; (2) the evaluation of various steels in terms of radiation sensitivity; (3) the assessment of the effects of nuclear environmental conditions and service stress conditions as factors in irradiated steel behavior, and (4) determination of the influence of thermal environment (during and after irradiation) on the neutron embrittlement of reactor steels. (Author)

N66-38120 **Field 18J, 20B, 18I**
CFSTI Prices HC$3.00 MF$0.50
Commissariat A L Energie Atomique, Saclay (France).
RESULTS AND INTERPRETATION OF SPECIAL INDICES MEASUREMENTS MADE WITH AQUILON.
Resultats Et Interpretation De Mesures D'indices

De Spectre Dans Aquilon
by J.-P. Frichet, J. Mougey, R. Naudet, and J. Taste. 1965, 56p CEA-R-2482
In French, English Summary

Descriptors: *Deuterium oxide, *Fuel element, *Lattice, *Spectrum, *Test reactor, Alloy, Detector, Experiment, Index, Integral, Measurement, Plutonium, Theory, Thermalization, Uranium, Water.

For abstract, see STAR 04 23.

PB-173 385 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
RESULTATS D'IRRADIATION D'ELEMENTS COMBUSTIBLES EN OXYDE MIXTE UO2 - Pu02 (Results of the Irradiation of Mixed UO2 - Pu02 Oxide Fuel Elements),
by Hubert Mikailoff, Jean-Pierre Mustelier, Jacquelin Bloch, Leon Ezran, and Lucien Hayet. Sep 66, 94p CEA-R-3066
Text in French; attached summary in English.

Descriptors: (*Breeder reactors, Reactor fuel elements), (*Reactor fuel elements, Radiation damage), Uranium compounds, Plutonium compounds, Dioxides, Microstructure, Radiography, Gamma-ray spectroscopy, Fission products, Neutron flux, Phase studies, Fast reactors, France.

Identifiers: Cadarache reactors (Rapsodie).

In order to study the behaviour of fuel elements used for the first charge of the reactor Rapsodie, a first batch of eleven needles was irradiated in the reactor EL3 and then examined. These needles (having a shape very similar to that of the actual needles to be used) were made up of a stack of sintered mixed-oxide pellets: UO2 containing about 10 per cent of PuO2. The specific powers varied from 1230 to 2700 W/cc and the can temperature was between 450 and 630C. Examination of the needles (Metrology, radiography and gamma-spectrography) revealed certain macroscopic changes, and the evolution of the fuel was shown by micrographic studies. These observations were used, together with flux measurements results, to calculate the temperature distribution inside the fuel. The volume of the fission gas produced was measured in some of the samples; the results are interpreted taking into account the temperature distribution in the oxide and the burn-up attained. Finally a study was made both of the behaviour of a fuel element whose central part was molten during irradiation, and of the effect of sodium which had penetrated into some of the samples following can rupture. (Author)

N66-37780 **See Field 18H**

N66-37781 **See Field 18I**

PB-173 389 **See Field 18G**

PB-173 394 **See Field 7E**

18K. REACTOR PHYSICS

N66-33110 **Field 18K**
CFSTI Prices HC$1.00 MF$0.50
United Kingdom Atomic Energy Authority, Risley (England). The Reactor Group.
THE EFFECT OF DEFECTS ON THE BASAL PLANE THERMAL CONDUCTIVITY OF A GRAPHITE CRYSTAL. PART I - THEORY.
by B. T. Kelly. 6 May 66, 14p TRG-1239/C/, PT. I

Descriptors: *Crystal, *Graphite, *Lattice vibration, *Relaxation time, *Thermoconductivity, *Vibrational spectrum, Approximation, Base, Conductivity, Defect, Isotope, Lattice, Phonon, Plane, Point, Relaxation, Scattering, Spectrum, Theory, Thermal, Time, Vibration.

For abstract, see STAR 04 19.

N66-33125 **Field 18K**
CFSTI Prices HC$3.00 MF$0.75
Aktiebolaget Atomenergi, Stockholm (Sweden).
REACTION RATE DISTRIBUTIONS AND RATIOS IN FRO ASSEMBLIES 1, 2, AND 3.
by T. L. Andersson. 1966, 60p AE-229

Descriptors: *Fast reactor, *Nuclear reaction, *Reaction time, *Spatial distribution, Core, Distribution, Fast, Fission, Graphite, Nuclear, Rate, Ratio, Reaction, Reactor, Spatial, Time, Uranium.

For abstract, see STAR 04 19.

N66-33429 **Field 18K**
CFSTI Prices HC$3.00 MF$0.75
European Atomic Energy Community, Brussels (Belgium).
THE USE OF PULSED REACTORS IN THE FIELD OF NEUTRON AND SOLID STATE PHYSICS.
by W. Kley. 1965, 58p EUR-2538.E
Presented At The Symp. "panel On Kinet. And Appl. Of Pulsed Res. Reactors", Vienna, 17-21 May 1965

Descriptors: *Fast reactor, *Neutron physics, *Solid state physics, Beam, Cross section, Elastic, Experiment, Facility, Fission, Fragment, Inelasticity, Neutron, Nuclear, Physics, Pulse, Radiation, Scattering, Solid, Source, State, White.

For abstract, see STAR 04 19.

N66-33434 **Field 18K**
CFSTI Prices HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
EFFICIENCY OF ORGANIC SCINTILLATORS FOR FAST NEUTRONS.
by R. J. Schuttler. Jul 66, 71p NASA-CR-76860, ORNL-3888
Contract NASA ORDER R-104, W-7405-ENG-26

Descriptors: *Fast neutron, *Neutron detector, *Scintillator, Anisotropy, Approximation, Carbon, Cascade, Collision, Cross section, Detector, Edge, Effect, Efficiency, Fast, Inelasticity, Light, Model, Neutron, Organic, Output, Proton, Scattering.

For abstract, see STAR 04 19.

N66-37680 **Field 18K**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
HIGH-ENERGY ION BEAMS USED TO ACCELERATE HYDROGEN PROPELLANT ALONG MAGNETIC TUBE OR FLUX.
by G. W. Englert. Oct 66, 51p NASA-TN-D-3656
Contract 120-27-06-04-22

Descriptors: *Energy transfer, *Hydrogen, *Ion beam, *Magnetohydrodynamic acceleration, Field, Flow, Flux, High energy, Magnetic, Particle, Propellant, Rocket, Thermonuclear, Tube.

For abstract, see STAR 04 23.

18L. REACTORS (POWER)

N66-33021 **Field 18L**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
CRITICAL MASS STUDIES WITH THE NASA ZERO POWER REACTOR II. II - HETEROGENEOUS ARRAYS OF CYLINDRICAL VOIDS.
by H. C. Ford, T. A. Fox, and R. A. Mueller. Aug 66, 25p NASA-TN-D-3555
Contract 122-28-03-02-22

Descriptors: *Critical mass, *Reactor fuel, *Uranium fluoride, *Zero power reactor ii (zpr-ii), Aqueous, Array, Configuration, Core, Critical, Cylinder, Fluoride, Fuel, Heterogeneity, Mass, Power, Reactor, Uranium, Uranyl, Void, Zero, Zpr.

For abstract, see STAR 04 19.

18N. SNAP TECHNOLOGY

N66-37683 **Field 18N**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
ANALYSIS OF CONDENSING PRESSURE CONTROL FOR SNAP-8 SYSTEM.
by K. S. Jefferies, D. R. Packe, A. A. Schoenberg, and R. C. Tew. Oct 66, 27p NASA-TM-X-1292
Contract 701-04-00-00-22

Descriptors: *Condenser, *Control system, *Pressure, *Rankine cycle, *Snap- 8_2 Analysis, Characteristics, Computer, Dynamic, Flow, Heat, Loop, Radiator, Rejection, Simulation, State, Steady.

For abstract, see STAR 04 23.

19A. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

AD-232 645 **Field 19A**
CFSTI Price: HC$9.60
Propellex Div., Chromalloy Corp., Evansville, Ill.
A STUDY OF MODERNIZED TECHNIQUES FOR THE MANUFACTURE OF BLACK POWDER.
Final rept.
31 Jan 60, 99p
Contract DAI-23-072-501-ORD (P)-43

Descriptors: (*Explosive materials, *Manufacturing methods), (*Powders, Charcoal), Mixtures, Nitrates, Potassium compounds, Sulfur.

New approaches to the production of black powder, using both solvents and non-soluting vehicles, followed by hydraulic compacting or tabletizing are investigated. Measurements of dP/dt at different pressures in a closed bomb are used to compare experimental samples and commercial products. The influence of a regular geometry on ballistic performance is considered and a process for yielding a product similar to commercial black powder is developed.

AD-413 927 **Field 19A**
CFSTI Price: HC$4.60
Army Engineer Research and Development Labs., Fort Belvoir, Va.
CORUSCATIVES AS ADDITIVES FOR HIGH-BLAST EXPLOSIVES,
by Howard J. Vandersluis. 14 Mar 63, 43p
Technical rept. 1743-TR
Task 8F07-10-002-01
Availability: Original document in color until exhausted.

Descriptors: (*Explosive materials, Additives), (*Cratering, Explosive materials), Aluminized explosives, Chemical reactions, Optimization, Light pulses, Charges (Explosive), Titanium, Carbon, Aluminum compounds, Oxygen compounds, Ammonia, Detonations, Explosions, Demolitions, Blast, TNT, Thermite, Powders.

An evaluation was made of 'coruscatives' for increasing the effectiveness of cratering explosives. Coruscatives is the term applied to chemicals which combine exothermically to form solids which are so intensely hot that the particle surface is alternately molten and solid producing light variations (coruscating). The coruscatives studied were: thermite, titanium-carbon, and aluminum-oxygen. These materials were either inserted in cylinders, within an explosive charge or mixed with the explosive. High-speed photography of charges fired in an air indicated that the expected reaction occurred but that the reaction was too slow to influence the pressure pulse; however, an average of 40 percent improvement was produced in cratering results when the coruscative was mixed with the explosive. It is concluded that: (1) coruscatives can significantly increase the effectiveness of cratering charges, and (2) further increases in crater-charge effectiveness will be possible when procedures for use of coruscatives are optimized. (Author)

AD-641 485 **Field 19A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Frankford Arsenal, Philadelphia, Pa. Chemistry Research Lab.
TRACER AMMUNITION CONTAINING FERROMAGNETIC MATERIALS AS ADDITIVES: EFFECTS ON OVERALL PERFORMANCE.
Technical research memorandum rept.,
by Herbert Ochitill. Sep 66, 14p
Proj. DA-1X2421.06D23.0
FA-M67-2-1

Descriptors: (*Tracers (Ordnance), *Quality control), Ferromagnetic materials, Additives, Performance (Engineering), Burning rate, Intensity, Magnetic fields, Processing.

A study was made of the effect on tracer ammunition performance of loading tracer mixtures containing ferromagnetic additives under the influence of a magnetic force field. In a preliminary investigation on the controlled application of magnetic force fields during the loading of tracer ammunition containing tracer compositions with ferromagnetic additives, the quality control of tracer ammunition has been significantly improved. Fifty percent reduction in standard deviations in both total burning time and maximum light intensity were observed, with accompanying increases in maximum light intensity exceeding ten percent. (Author)

AD-641 643 **Field 19A**
CFSTI Prices: HC$2.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Ammunition Engineering Directorate.
DEFICIENCY INVESTIGATION OF THE 1-LB. TNT DEMOLITION BLOCK CHARGE,
by Leo Roberts. Oct 66, 27p
PA-TR-3458

Descriptors: (*TNT, Demolitions), (*Demolitions, Malfunctions), Detonators, Disposal.

Identifiers: M-6 Detonators, M-7 Detonators.

At Camp Clark in Nevada, Missouri, in August 1965, 100 1-lb. TNT Demolition Block Charges (Lot SOD 600-1) failed to function. The circumstance causing this malfunction was investigated by the Ammunition Engineering Directorate's Ammunition Engineering Laboratory. It was determined that these TNT charges failed to detonate because of insufficient energy from the initiating devices. To detonate these 1-lb. TNT block charges, only four types of blasting caps must be used -- M6 and M7 Blasting Caps (military) and JI and JII (commercial); if Primacord is used, the exact procedure in FM 5-25 must be followed: three snug turns around the block. Release of the lot was recommended based on these findings. (Author)

AD-641 697 **Field 19A, 7B, 7C**
CFSTI Prices: HC$3.00 MF$0.75
Army Engineer Research and Development Labs., Fort Belvoir, Va.
AZIDE TITLES,
by Hyman Rosenwasser. Sep 66, 62p Rept. no. 1870
Task 1C014501A32B-01

Descriptors: (*Azides, Bibliographies), Explosive materials, Chemical properties.

The report is a bibliography of literature references dealing with all types of azide investigations reported during 1964 and 1965. References for 1959, 1960, 1962, and 1963 are also included. (Author)

AD-641 893 **Field 19A**
CFSTI Prices: HC$2.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Pyrotechnics Lab.
STORAGE STABILITY OF PYROTECHNIC COMPOSITIONS CONTAINING VINYL ALCOHOL ACETATE RESIN.
Technical rept.,
by James A. Carrazza, Jr., and Seymour M. Kaye. Nov 66, 30p
Proj. DA-504-01-207
PA-TR-3357

Descriptors: (*Pyrotechnics, Storage), (*Binders, Pyrotechnics), (*Vinyl plastics, Binders), Stability, Thermal stability, Thermochemistry, Ignition, Degradation, Brightness, Burning rate, Polyvinyl alcohol, Acetates.

Long term storage surveillance was conducted on pyrotechnic compositions employing vinyl alcohol acetate resin (VAAR) as a binder. The storage stability of the composition after it had been exposed to ambient and high temperature (167F) storage conditions was determined. Weight losses occurred when pyrotechnic ingredients and compositions containing VAAR were conditioned at 167F; however, these weight losses were tolerable with nominal (4-6%) VAAR concentrations. Thermochemical analysis revealed that the presence of VAAR lowers the ignition and the degradation temperature of pyrotechnic ingredients and compositions. In all cases, however, these temperatures remained above any temperature likely to be encountered in actual storage. The illuminance and burning rate characteristics of typical yellow, red, and green consolidated systems containing VAAR did not show any changes as a result of a one-year surveillance period at both ambient and high (167F) temperatures. It was concluded that VAAR can be used as an alternate for Laminac as a binder in consolidated pyrotechnic compositions. (Author)

AD-641 957 **Field 19A**
CFSTI Prices: HC$1.00 MF$0.50
Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
NEW FLARE FORMULATIONS FOR HIGH ALTITUDE APPLICATION,
by James A. Carrazza, Jr., Bossie Jackson, Jr., and Seymour M. Kaye. Oct 66, 24p
Proj. DA-504-01-027
PA-TR-3360

Descriptors: (*Flares, High altitude), Intensity, Illumination, Burning rate, Magnesium, Zirconium, Hafnium, Magnesium alloys, Barium alloys, Strontium compounds, Sodium compounds, Nitrates, Oxidizers, Sensitivity, Tests.

A comparison of various fuels, such as atomized magnesium, zirconium, hafnium, magnesium-barium alloy, and magnesium-strontium alloy, under ambient and simulated high altitude conditions has been conducted. The metal powders were evaluated in binary formulations using sodium nitrate oxidant. Kraft paper tubes having a 0.625 inch ID and 0.0625 inch wall thickness were used as test vehicles. Data analyses indicated that all the formulations containing the various fuels sustained significant decreases in candlepower and burning rate in the transition from ambient pressure to reduced pressure simulating various altitude levels. Only the formulations containing zirconium and hafnium were tested at a simulated altitude of 100,000 feet. The data obtained for the alloy-containing compositions at 80,000 feet did not justify further evaluations at 100,000 feet simulated altitude. At simulated altitudes of 80,000 feet and lower, the powdered zirconium and some of the alloy-containing systems were observed to be superior to those formulations containing atomized magnesium. The systems which contained magnesium-barium alloy were found to be superior to the magnesium-strontium and the mixed alloy formulations under reduced pressure conditions. The data generated for the hafnium/sodium nitrate formulation at simulated altitudes of 80,000- and 100,000 feet was not considered reliable since the light output was below the sensitivity of the instrumentation. (Author)

AD-263 170 **See Field 19D**

AD-451 179 **See Field 19F**

AD-641 977 **See Field 20D**

19C. COMBAT VEHICLES

AD-408 653 **See Field 13F**

19D. EXPLOSIONS, BALLISTICS, AND ARMOR

AD-263 170 **Field 19D, 19A**
CFSTI Price: HC$11.60
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
CRATERING FROM HIGH EXPLOSIVE CHARGES. ANALYSIS OF CRATER DATA,
by J. N. Strange, and C. Denzel. Jun 61, 111p
AEWES-TR2-547

Descriptors: (*Cratering, Blast), Explosive materials, Mathematical analysis, Measurement.

Crater measurements from approximately 1800 shots in more than 20 media with charge weights ranging from less than 1 lb to 320,000 lb were analyzed to: (a) Gain a better understanding of the problems involved in determining the shape and size of craters formed by high explosives; (b) Establish the order of variation that characterizes cratering data; and (c) Develop improved and/or more generalized techniques for predicting crater dimensions. Scaling trends for shots fired on or under the ground are determined from plots of crater radius and depth as a function of charge weight. By means of the least-squares procedure, the equation of the line best fitting the data was determined, along with 95% confidence limits, thereby establishing empirically the scaling laws that relate crater size and charge weight. The well-known cube-root scaling law is not entirely acceptable for scaling all dimensions of a crater; apparently this law varies with the type of medium being cratered and the charge weight and position, curves are presented to assist in predicting crater size and shape for charges up to 1,000,000 lb of TNT. Also, the influence of various soil types on crater size is shown graphically. (Author)

AD-641 655 **Field 19D, 12A**
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
AN ANALYSIS OF THE TWO-DIMENSIONAL PARTICLE-IN-CELL METHOD,
by M. A. Kaplan, and R. A. Papetti. Sep 66, 51p
RM-4876-PR
Contract AF 49(638)-1700

Descriptors: (*Impact shock, *Numerical methods and procedures), Hypervelocity projectiles, Nuclear explosions, Explosion ef-

fects, Errors, Integration, Partial differential equations, Mass-energy relation, Stresses.

Identifiers: Particle-in-cell method.

Final results are given for an investigation of the nature of the errors that arise in the course of Particle-In-Cell (PIC) computation process. Among the important conclusions are that the dominant error terms bear only a casual relation to physical effects; that a pseudostress can be constructed that gives rise to the dominant errors in the momentum equation and to some of the errors in the energy equation associated with the gradients of the fluid velocity; and that the axisymmetric elements of the pseudostress suggest that the PIC equations contain errors that lead to effects associated with polar fluids. (Author)

ATI-33 190 **Field 19D**
CFSTI Price: HC$2.60
Naval Ordnance Test Station, China Lake, Calif.
THE DECAY OF SHOCK WAVES,
by B. Cassen, and J. S. Stanton. 29 Mar 48, 21p
NOTS-127
NAVORD-1011

Descriptors: (*Shock waves, Intensity), Pressure, Wake, Fluid mechanics, Blast.

The instantaneous rate of decay or intensification of a shock front in any fluid for which dissipative effects are localized in a shock zone is shown to be directly related to the coexisting pressure gradient in the wake of the wave adjacent to the front. The higher time derivatives of the shock velocity are also explicitly related, although in a more complicated fashion, to the higher spatial derivatives of wake pressure. Thus the experimental observation of the velocity, or some related variable of a blast or ballistic shock wave, can be used to ascertain properties of the fluid motion in the wake of the shock. Conversely, a knowledge of the wake profile at any instant can be employed to determine the corresponding rate of decay of the shock front. The general theory is applicable to shocks of all strengths where an equation of state can be applied graphically or analytically. (Author)

PB-173 471 **Field 19D**
CFSTI Prices: HC$4.60 MF$0.50
Weapons Research Establishment, Salisbury (Australia).
AN IBM 7090 SIX DEGREES OF FREEDOM RIGID BODY TRAJECTORY PROGRAM.
Technical note,
by P. L. Goodale. Jun 66, 47p TN-HSA-118

Descriptors: (*Bomb trajectories, *Programming (Computers)), Aerodynamics, Partial differential equations, Equations of motion, Stability, Australia.

This note describes a rigid body six degrees of freedom trajectory program written to study the flight dynamics of a cruciform fin stabilised bomb having either a fixed or free spinning tail assembly. Disturbances to the bomb due to (1) release from an aircraft, (2) winds and (3) lateral pulse rockets can be taken into account. The program is written in FORTRAN for an IBM 7090 computer running under W.R.E. monitor. The mathematical formulation of the problem is presented together with a FORTRAN listing and a description of the input and output. (Author)

AD-641 339 **See Field 5A**

AD-641 433 **See Field 11E**

AD-641 982 **See Field 16B**

19E. FIRE CONTROL AND BOMBING SYSTEMS

AD-641 824 **See Field 5I**

19F. GUNS

AD-451 179 **Field 19F, 19A**
CFSTI Price: HC$5.60
Frankford Arsenal, Philadelphia, Pa. Research and Development Directorate.
SOLID PROPELLANTS FOR SMALL ARMS AMMUNITION: A REVIEW AND RECOMMENDED RESEARCH,
by Marvin E. Levy. Sep 64, 52p
Proj. DA-1W-523801A29312
FA-R-1733

Descriptors: (*Small arms ammunition, Ammunition propellants), (*Ammunition propellants, Scientific research), (*Scientific research, Ammunition propellants), Velocity, Ballistics, Interior, Burning rate, Combustion, Stability, Military research, Erosion, Gun barrel.

A survey was conducted on the status of the small arms propellant field, to delineate problem areas, and discover research and development requirements for small arms ammunition. The information presented covers: increased velocity, ingredients, stability, temperature coefficient of ballistics, barrel erosion, muzzle flash and smoke, combustion and propellant characterization, and general performance characteristics. (Author)

19G. ROCKETS

AD-445 710 **Field 19G**
CFSTI Price: HC$2.00
Naval Ordnance Test Station, China Lake, Calif.
ROCKET LAUNCHER STUDIES,
by D. Rossin, P. R. Zagala, V. J. Taylor, and M. Amparano. Aug 64, 33p NOTS-TP-3477
NAVWEPS-8501

Descriptors: (*Rocket launchers, Performance (Engineering)), Tests, Air-to-surface, Air-to-air, Locking fastener devices, Launching, Test methods, Firing test (Ordnance), Structural integrity.

A series of rocket launcher tests was made at the U. S. Naval Ordnance Test Station during the period June to December 1963. These tests were conducted to obtain information and data on rocket launcher firing characteristics for use in investigating and correcting launcher deficiencies reported by the Fleet, to determine the adequacy of proposed launcher design changes or material substitutions, and to determine the adaptability of the launchers to various aircraft.

AD-452 106 **Field 19G**
CFSTI Price: HC$2.60
Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex. Environmental Sciences Directorate.
SIX DEGREE OF FREEDOM DIGITAL SIMULATION MODEL FOR UNGUIDED FIN-STABILIZED ROCKETS,
by Louis D. Duncan, and Ronald J. Ensey. Nov 64, 28p ERDA-196
Proj. DA-1V014501B53A-10

Descriptors: (*Rocket models, Orbital trajectories), (*Space flight, Simulation), Mathematical models, Fin stabilized ammunition, Wind, Moments, Aerodynamic characteristics, Stability, Aerodynamic loading, Reentry vehicles, Thrust, Differential equations, Programming (Computers), Matrix algebra, Transformations (Mathematics), Equations of motion.

A six degree of freedom model for digital simulation of the trajectory of an unguided, fin-stabilized rocket is developed. A derivation of the equations and an explanation of the equations and an explanation of the coordinate systems are presented. The development assumes that the trajectory will be over a rotating planet with a variable atmosphere. A spacevariable, three-dimensional wind vector is assumed. The equations of motion are derived from Newton's laws of motion. The aerodynamic forces and moments are based on the theory of stability derivatives and the assumption of linear aerodynamics. The body axes are assumed to be principal axes of inertia. (Author)

AD-455 918 **Field 19G, 13H**
CFSTI Price: HC$5.00
Thiokol Chemical Corp., Huntsville, Ala.
EVALUATION OF THE LYON, INC. FORTY INCH DIAMETER ROCKET MOTOR CASE FABRICATED BY THE HOT CUP-COLD DRAW PROCESS.
Phase rept.,
by David L. Daigle. 29 Jan 65, 156p Rept. no. 305-65
Contract DA-01-021-ORD-11919

Descriptors: (*Rocket cases, Material forming), Hydrostatic pressure, Steel, Low-temperature research, Mechanical properties, Manufacturing methods, Hot working, Cold working, Drawing (Machine processing), Test equipment, Test methods, Stresses, Strain (Mechanics), Ductility.

As part of an Army Material Research Agency program to evaluate candidate rocket motor cases for future army missile systems, an evaluation was performed of a motor case. The case was made from D6AC steel by a hot cup-cold draw process and conformed generally to the Pershing second stage motor case configuration. After dimensional and radiographic inspections, the case was subjected to a hydrostatic proof pressurization test at -65 F. A hydrodynamic pressurization test at -65 F, and a hydrostatic burst pressurization test at -65 F. The case performance under the low temperature pressurization tests was entirely satisfactory. The case failed in a ductile manner at a biaxial strength level of 274,000 psi, demonstrating that a large motor case possessing high strength and good elongation could be fabricated by the hot cup-cold draw process. The performance of the Lyon case was compared to the performance of two other Pershing second stage motor cases manufactured with D6AC steel. Based on the comparison, it appears that the performance of the Lyon case under pressurization differs little from the performance of the second stage Pershing cases presently being manufactured. (Author)

19H. UNDERWATER ORDNANCE

AD-255 169 **Field 19H**
CFSTI Price: HC$14.80
Woods Hole Oceanographic Institution, Mass.
INSTRUCTION MANUAL FOR PRECISION GRAPHIC RECORDER (PGR),
by S. T. Knott, and W. E. Witzell. Oct 60, 152p
WHOI-Ref-60-38
Contract NObsr-72521
Proj. NR-261-102

Descriptors: (*Depth changes, Echo ranging), (*Facsimile equipment, Design), (*Sound ranging, Acoustic ranges), Display systems, Instruction manuals, Maintenance, Measurement, Ocean bottom, Oceanographic data, Operation, Phase measurement, Recording paper, Recording systems.

This manual describes the objectives, design, operation, and maintenance of the Precision Graphic Recorder (PGR), emphasizing its application to echo-sounding. The words 'precision graphic recording' describe a method for displaying data by means of successive, precisely-timed rectilinear sweeps of a recording point or 'stylus' across a long, moving strip of sensitized paper. The record-

ed data appear as dye-markings, shaded on proportion to signal amplitude along the sweep of the moving recording point.

20A. ACOUSTICS

AD-641 392 **Field 20A**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Geology and Geophysics.
SPEED OF SOUND IN UNCONSOLIDATED SEDIMENTS OF BOSTON HARBOR, MASSACHUSETTS.
Master's thesis,
by Lloyd Frederick Lewis. Sep 66, 69p
Contract Nonr-1841 (74)
Proj. NR-083-157

Descriptors: (*Sound transmission, *Sedimentation), Harbors, Massachusetts, Underwater sound.

In situ measurements of the speed of sound in surfical marine sediments of Boston Harbor have been made at approximately 100 stations. A simple spark discharge of charged capacitors created the sound pulse which was received by a conventional hydrophone-amplifier-oscilloscope system. Photographs were taken of the trigger pulse as displayed on the oscilloscope screen. Detailed time records were obtained using a delay time base. First arrivals transmitted by the hydrophone appeared in the frequency range of 10 to 30 kilocycles/second while the sound source likely emitted a broad spectrum of frequencies. Sediment samples at all stations have been obtained either by gravity coring (aided by hammar blows) or bucket grabs. Laboratory analyses of grain size distribution and water content have been made. Porosity was calculated assuming complete water saturation. The author attempted to correlate these various physical properties with in situ sound speed measurements and has compared his work to studies of similar sediments by other investigators. The presence of methane and hydrogen disulfide gases in the sediment limited the degree of simple correlation between sound transmission and other physical properties. (Author)

AD-641 604 **Field 20A**
CFSTI Prices: HC$4.00 MF$0.75
Tennessee Univ., Knoxville. Ultrasonics Lab.
AN INVESTIGATION OF SUBHARMONIC GENERATION IN AN ULTRASONIC RESONANT CAVITY.
Technical rept.,
by William Ross McCluney. Jun 66, 104p TR-2
Contract Nonr-4289 (01)
Proj. NR-384-306
Master's thesis.

Descriptors: (*Ultrasonic radiation, Nonlinear systems), (*Sound, Propagation), Cavity resonators, Transducers, Sound generators, Resonant frequency.

Identifiers: Subharmonic waves.

The generation of subharmonics of the driver frequency in an ultrasonic resonant cavity was investigated by means of both optical and electronic techniques. The subharmonics are found to be generated when the cavity is in resonance at the driver frequency. The frequencies of the subharmonics were observed to be integral sub-multiples of the driver frequency. An important result is that is not necessary for the cavity to be in resonance at the subharmonic frequency for the subharmonic to be generated. The relationship between this phenomenon and other phenomena, such as laser action, parametric amplification, and optical power limitation, is pointed out. (Author)

AD-641 931 **Field 20A**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass.
EXPERIMENTAL DETERMINATION OF ULTRASONIC TRANSDUCER FREQUENCY RESPONSE.
Technical rept.,
by Otto R. Gericke. Sep 66, 13p AMRA-TR-66-27
Proj. PEMA-4930.1

Descriptors: (*Electroacoustic transducers, Ultrasonic radiation), Frequency analyzers, Performance (Engineering), Test methods, Ceramic materials.

An electronic test method for determining frequency response characteristics of ultrasonic transducers is described. The method involves an actual transmission and reception of ultrasonic signals and yields the loop response curve of a transducer. In examining the frequency response of a number of commercially made ceramic transducers, large variations are found. It is concluded that for a correct correlation of ultrasonic test results, the complete transducer response curve should be known and included in the manufacturer's specifications. (Author)

N66-38754 **Field 20A**
CFSTI Prices HC$2.50 MF$0.50
Andrews Associates, Inc., Oklahoma City, Okla.
COMPUTATION OF THE PRESSURE-TIME HISTORY OF A SONIC BOOM SHOCK WAVE ACTING ON A WINDOW GLASS IN A BUILDING.
by G. W. Zumwalt. 20 Jun 66, 52p NASA-CR-66169
Contract NAS1-5813

Descriptors: *Pressure measurement, *Shock wave, *Sonic boom, *Structural material, *Window, Boom, Building, Calculation, Glass, Mathematics, Measurement, Pressure, Reflection, Shock, Sonic, Structure, Time, Wall, Wave.

For abstract, see STAR 04 23.

AD-44 181 **See Field 9E**

AD-454 575 **See Field 17A**

AD-641 334 **See Field 8J**

AD-641 352 **See Field 6S**

AD-641 405 **See Field 5A**

AD-641 720 **See Field 14B**

AD-641 861 **See Field 20L**

AD-88 698 **See Field 14B**

20B. CRYSTALLOGRAPHY

AD-641 305 **Field 20B**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Corp., El Segundo, Calif. Lab. Operations.
LOCALIZED COOLING IN FLUX CRYSTAL GROWTH.
Rept. for Jul 65-May 66,
by A. B. Chase, and Judith A. Osmer. Aug 66, 20p
Rept. no. TR-1001 (9230-02)-1
Contract AF 04 (695)-1001
SSD-TR-66-174

Descriptors: (*Crystal growth, Cooling), Temperature control, Lead compounds, Oxides, Fluorides, Zinc compounds, Furnaces, Ruby, Gallium compounds, Thorium compounds, Garnet, Aluminum compounds.

Large crystals of a number of compounds have been grown from PbO-PbF2 flux systems utilizing a temperature gradient and localized cooling. The temperature gradient and localized cooling were induced by a jet of cold air directed on the crucible bottom. The temperature gradients of the crucible were measured and were found to be much less than the furnace temperature gradient. The technique is described, and a comparison is made of crystals grown with and without a temperature gradient. (Author)

AD-641 383 **Field 20B**
Not available from CFSTI.
Columbia Univ., New York. Dept. of Mechanical Engineering.
DISLOCATION KINK IN A CRYSTAL MODEL.
Interim rept.,
by W. T. Sanders. 14 Jan 65, 10p
Grant AF-AFOSR-228-63
Proj. AF-9761
Task 976101
AFOSR-66-1298
Availability: Published in Journal of Applied Physics v36 n9 p2822-9 Sep 1965.

Descriptors: (*Crystal lattice defects, Mathematical models), Stresses, Shear stresses, Crystals.

A modified Frenkel-Kontorova dislocation model, with a piecewise linear substrate potential, is extended to two dimensions to describe the entire slip plane of the dislocation with one kink. Accurate solutions are found, with the aid of several analytic techniques and a digital computer, for the static configuration under applied stress. The kink Peierls stress, the kink width, and the kink energy, are determined for a range of values of gamma the perfect crystal shear strength. Kink Pereris stress is found to be very sensitive to gamma, and to have maxima of the order of 0.000001 to 0.00001, in units of the shear modulus. Kink width and kink energy are less sensitive to gamma; kink width ranges from approximately 4 to approximately 30 lattice parameters, while kink energy varies from several hundred to several thousand degrees Kelvin for typical parameters. (Author)

AD-641 384 **Field 20B**
Not available from CFSTI.
Columbia Univ., New York.
COMPUTER SIMULATION OF VACANCY MIGRATION.
Interim rept.,
by J. H. Weiner, and W. F. Adler. 12 Nov 65, 18p
Grant AF-AFOSR-228-63
AFOSR-66-1652
Availability: Published in The Physical Review v144 n2 p511-24 Apr 15 1966.

Descriptors: (*Crystal lattice defects, Mathematical models), Motion, Thermal properties, Simulation, Computers.

An idealized model for a vacancy in a crystal lattice which permits vacancy migration is presented. It consists of a linear chain of atoms together with a substrate potential, with piecewise linear force laws between nearest-neighbor atoms and between atoms and substrate. The predictions of the Vineyard equilibrium rate theory are calculated explicitly for this model. A computer simulation procedure is described which reproduces some, although not all, of the statistical characteristics of thermal equilibrium. The jump rates observed in the simulation agree reasonably well with those predicted by the Vineyard theory. (Author)

AD-641 390 **Field 20B, 20L**
CFSTI Prices: HC$2.00 MF$0.50
Delaware Univ., Newark. Dept. of Physics.
TIME PERIODIC SOLUTIONS OF TRANSPORT-AND POISSON-EQUATIONS FOR LAYERLIKE FIELD INHOMOGENEITIES.
Technical rept.,
by K. W. Boer. 1966, 45p TR-14
Contract Nonr-4336 (00)

Descriptors: (*Crystals, *Transport properties), Semiconductors, Field theory, Electron density, Differential equations.

Identifiers: Gunn effect.

Time dependent solutions of the Poisson and transport equations containing drift and diffusion for the case of layerlike fiel inhomogeneities propagating underformed and with constant velocity through a crystal, are discussed in terms of an analysis of their projections in the n-E plane. Two principal models are discussed: one for a trap controlled cyrstal (CdS type), and the other for a trap-free crystal (GaAs type, Gunn effect) for field dependent recombination or field dependent mobility. It is found that, in addition to the 'triangular' domains, periodic propagating solutions can exist. Conditions on the value of the layer velocity and the current are derived. (Author)

AD-641 483 **Field 20B, 20L**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Physics.
ON THE CURVES IN THE GRENINGER AND LEONHARDT NETS,
by A. Bernalte. 22 Jan 65, 5p
Grant AF-AFOSR-290-63
Proj. AF-9763
Task 967302
AFOSR-66-1599
Availability: Published in Acta Cryst. v19 p916-8 1965.

Descriptors: (*X-ray diffraction analysis, *Graphics), Algebraic geometry, Crystallography.

Identifiers: Greninger's chart, Leonhardt's chart, Laue's method.

The algebraic equations for the lines in both the Greninger and Leonhardt charts are derived, in order to complete or correct the statements found in the current literature. The meridians are conics and the parallels are quartics. Also, parametric equations are given for computational purposes. (Author)

AD-641 539 **Field 20B**
Not available from CFSTI.
Syracuse Univ., N. Y. Dept. of Physics.
LATTICE VIBRATIONS OF WURTZITE STRUCTURE CRYSTALS.
Interim rept.,
by John J. Sullivan. 10 Jan 64, 21p
Grant AF-AFOSR-420-63
Proj. AF-9763
Task 976302
AFOSR-66-1267
Availability: Published in The Journal of Physics and Chemistry of Solids v25 p1039-56 1964.

Descriptors: (*Crystal lattices, Dynamics), Vibration, Crystals, Equations of motion, Mathematical models, Crystal structure.

The article presents expressions based on the general shell model of lattice dynamics, for all important long wavelength properties of the lattice vibration spectrum of a wurtzite structure crystal and for the vibration frequencies having wave vectors along the hexagonal axis of the first Brillouin zone. The dynamics of the wurtzite structure is discussed in terms of sum and difference mode parameters. The dynamics of the sum modes in wurtzite is closely related to the dynamics of a sphalerite structure crystal which has been given previously by Kaplan and Sullivan. In an effort to evaluate some of the parameters of our model by fitting our theoretical expressions to available experimental data, we have made two approximations; (1) The non-Coulomb force constants are limited to interactions with the four nearest neighbors. (2) The dynamics of the sum modes is made equivalent to the dynamics of a sphalerite crystal. (Author)

AD-641 546 **Field 20B**
Not available from CFSTI.
Cornell Univ., Ithaca, N. Y. Dept. of Engineering Physics.
KIKUCHI EFFECTS FROM LOW-ENERGY ELECTRONS IN NICKEL,
by J. L. Robins, R. L. Gerlach, and T. N. Rhodin.
21 Oct 65, 5p
Grant AF-AFOSR-876-65
Proj. AF-9761
Task 976103
AFOSR-66-1320
Availability: Published in Applied Physics Letters v8 n1 p12-4 Jan 1 1966.

Descriptors: (*Electron diffraction analysis, *Nickel), Single crystals, Crystal lattices, Electron beams, Energy.

Identifiers: Kikuchi effects.

The occurrence of Kikuchi lines and bands during high-energy (10 to 100 keV) electron diffraction studies of highly perfect single crystals is well understood. Reflection electron-diffraction effects at large angles of inidence obtained with 700- to 1250-eV electrons are now displayed in a manner which emphasizes the symmetry of the pattern and facilitates the analysis of its complex features. Some of the observed features resemble closely those obtained with high-energy electrons. (Author)

AD-641 760 **Field 20B, 20L, 20C**
Not available from CFSTI.
Western Reserve Univ., Cleveland, Ohio.
EFFECT OF ALLOYING ON THE PHONON SPECTRUM OF LEAD-INDIUM ALLOYS,
by J. G. Adler, J. E. Jackson, and B. S. Chandrasekhar. 22 Nov 65, 5p
Grant AF-AFOSR-565-64
Proj. AF-9763
Task 976302
AFOSR-66-1518
Availability: Published in Physical Review Letters v16 n2 p53-5 Jan 10 1966.

Descriptors: (*Lead alloys, Phonons), (*Indium alloys, Phonons), Superconductivity, Tunneling (Electronics), Band theory of solids, Cryogenics, Superconductors.

A report is made the observation of two new and interesting features in the phonon spectrum of lead-indium alloys, inferred from electron tunneling measurements. Even for alloys containing as much as 26% indium, the main features of the pure-lead phonon spectrum are practically unchanged, and the impurity band remains a distinct part of the spectrum. (Author)

AD-641 787 **Field 20B, 20F**
Not available from CFSTI.
Idaho Univ., Moscow. Dept. of Physics.
REFRACTIVE INDEX OF CALCIUM OXIDE.
Revised ed.,
by C. J. Liu, and E. P. Sieckmann. 17 Jan 66, 4p
Grant AF-AFOSR-634-64
Proj. AF-9761
Task 976102
AFOSR-66-1736
Revision of manuscript submitted 29 Sep 65.
Availability: Published in Journal of Applied Physics v37 n6 p2450-2 May 1966.

Descriptors: (*Refractive index, Calcium compounds), (*Calcium compounds, Oxides), Single crystals, Crystal growth, Spectra (Visible + ultraviolet).

Identifiers: Calcium oxide.

A method is described which has been successfully used to produce single crystals of calcium oxide of excellent optical quality from the melt. The absolute refractive index of two of these crystals was determined by the method of minimum deviation at room temperature (22-26C) for six wavelengths in the visible spectrum. The observed values for one of the crystals varied from 1.8328 plus or minus 0.00005 at the wavelength 6562.82 A to 1.8702 plus or minus 0.00005 for the Hg line at 4358.35 A. The corresponding values at these wavelengths for the other specimen were 1.8335 plus or minus 0.00006, respectively. (Author)

AD-641 788 **Field 20B**
Not available from CFSTI.
Idaho Univ., Moscow. Dept. of Physics.
REFRACTIVE INDEX OF STRONTIUM OXIDE,
by G. E. Pynchon, and E. F. Sieckmann. 26 Aug 65, 4p
Grant AF-AFOSR-634-64
Proj. AF-9761
Task 976102
AFOSR-66-1661
Availability: Published in The Physical Review v143 n2 p595-7 Mar 11 1966.

Descriptors: (*Refractive index, Strontium compounds), (*Strontium compounds, Oxides), Single crystals, Spectra (Visible + ultraviolet), Measurement, Crystal growth.

The refractive index of single crystals of strontium oxide has been measured for 6 wavelengths in the visible spectrum. The crystals were grown from the melt in a graphite resistance furnace by the method of Ohmic Heating. They were ground and polished into prisms, and the refractive index was determined by the method of minimum deviation. The absolute refractive index for the best crystal varied from 1.86245 plus or minus 0.00003 at the wavelength 6562.82A to 1.92585 plus or minus 0.00003 at the wavelength 4046.56A. (Author)

AD-641 798 **Field 20B, 11F**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
ORDER-DISORDER TRANSFORMATIONS AT 2:1 COMPOSITION IN THE CADMIUM-MERCURY SYSTEM.
Interim rept.,
by T. Claeson, H. L. Luo, T. R. Anantharaman, and M. F. Merriam. 17 Jun 65, 9p
Grant AF-AFOSR-631-64
Proj. AF-9763
Task 976302
AFOSR-66-1606
Availability: Published in Acta Metallurgica v14 p285-90 Mar 1966.

Descriptors: (*Cadmium alloys, Transformations), (*Mercury alloys, Transformations), Crystal lattices, Phase studies.

Order-disorder transformations at both the 2:1 compositions of a binary alloy system have been established for the first time. Low temperature x-ray diffraction and electrical resistivity data confirm the formation of such superlattices in the only intermediate phase of the Cd-Hg system, which extends from 35 to 85 at. % mercury. The transformations occur at -10 and -12C on cooling in alloys whose compositions approximate to the formulae Cd2Hg and Hg2Cd respectively. The superlattices conform to the 'Strukturbericht' type Cllb, which occur in several binary alloy systems in the ordered from only. Each cell of the ordered structure consists of three unit cells of the disordered structure stacked in the c direction. Accurate determination of the lattice parameters of alloys in the Cd-Hg intermediate phase region has been made to clear earlier uncertainties. Some modifications are proposed in the Cd-Hg phase diagram. (Author)

NBS-TN-293 **Field 20B, 20L**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Washington, D. C. Inst. for Materials Research.
RESEARCH ON CRYSTAL GROWTH AND CHARACTERIZATION AT THE NATIONAL BUREAU OF STANDARDS, JUNE 1966,
by Harry C. Allen, Jr. 26 Aug 66, 23p

Also available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.25.

Descriptors: (*Crystal structure, Analysis), (*Crystal growth, Reviews), Crystal lattice defects, Single crystals, Chemical analysis, Polymers, Crystallization, Nucleation, Mechanical properties, Crystal lattices.

The National Bureau of Standards with partial support from the Advanced Research Projects Agency of the Department of Defense is continuing a wide program of studies involving crystalline materials. These include investigation of methods and theory of growth, study of detection and effects of defects, determination of physical properties, refinement of chemical analysis, and determination of stability relations and atomic structure. The types of materials range from organic compounds, through metals, and inorganic salts to refractory oxides. This report summarizes progress in those projects wholly or partially supported by ARPA. (Author)

N66-33491 **Field 20B**
CFSTI Prices HC$3.75 MF$1.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CALCULATION OF FUNCTIONALS OF MATRICES ARISING IN SOLID STATE PHYSICS AND QUANTUM CHEMISTRY.
by P. B. Abraham. Jul 66, 254p NASA-TM-X-55551, X-611-66-303

Descriptors: *Analytic function, *Chemistry, *Matrix analysis, *Solid state physics, Analysis, Calculation, Crystal, Dynamics, Eigenvalue, Eigenvector, Finite, Function, Lattice, Mathematics, Matrix, Molecular, Orbit, Periodic, Perturbation, Physics, Poisson equation, Solid, State, Sum, System, Theory.

For abstract, see STAR 04 19.

N66-37785 **Field 20B, 20H**
CFSTI Prices HC$1.00 MF$0.50
Reactor Group, United Kingdom Atomic Energy Authority, Culcheth (England).
THE EFFECT OF DEFECTS ON THE BASAL PLANE THERMAL CONDUCTIVITY OF A GRAPHITE CRYSTAL. PART 2 - COMPARISON OF THE THEORY OF POINT DEFECT SCATTERING WITH CHANGES OF CONDUCTIVITY INDUCED BY FAST NEUTRON IRRADIATION. PART 3 - TEST OF THE THEORY OF GRAIN BOUNDARY SCATTERING.
by B. T. Kelly. 1966, 18p TRG-1239/C/, PT. 2, TRG-1239/C/, PT. 3

Descriptors: *Crystal structure, *Graphite, *Nuclear scattering, *Phonon, Base, Boundary, Conductivity, Defect, Fast, Grain, Irradiation, Lattice, Neutron, Plane, Point, Scattering, Theory, Thermal.

For abstract, see STAR 04 23.

N66-38060 **Field 20B, 20F**
CFSTI Prices HC$1.00 MF$0.50
Societa Ricerche Impianti Nucleari, Saluggia (Italy). Centro Ricerche Nucleari.
DIFFRACTOMETRIC RESEARCH IN THE FIELD OF DISORDERED STRUCTURES.
Ricerche Diffrattometriche Nel Campo Delle Strutture Disordinate
by M. Domenici, and H. Walther. 1965, 22p SORIN-78
In Italian Presented At The Natl. Res. Council Comm. For The Chem. Sci. Structural Diffractometric Chem. Meeting, Rome

Descriptors: *Crystal structure defect, *Displacement, *Fatigue test, *Neutron diffraction, *Turbine wheel, *X-ray diffraction, Absorption, Crystal, Defect, Diffraction, Dioxide, Lattice, Neutron, Research, Scattering, Silicon, Structure, Technique, X-ray.

For abstract, see STAR 04 23.

AD-641 324 **See Field 11B**

AD-641 405 **See Field 5A**

AD-641 538 **See Field 20L**

AD-641 653 **See Field 20K**

AD-641 657 **See Field 11B**

AD-641 694 **See Field 20F**

AD-641 772 **See Field 20L**

AD-641 780 **See Field 11F**

AD-641 791 **See Field 7D**

AD-641 911 **See Field 11B**

AD-641 958 **See Field 20L**

N66-38120 **See Field 18J**

20C. ELECTRICITY AND MAGNETISM

AD-465 151 **Field 20C, 17H**
CFSTI Prices: HC$2.00 MF$0.50
Lockheed Electronics Co., Plainfield, N. J.
PULSE COMPRESSION OPTICAL RANGING STUDY.
Quarterly progress rept. no. 3, 15 Dec 64-14 Mar 65.
by A. Reich, A. Tarasevich, and C. W. Barrett. 14 Mar 65, 40p
Contract DA-28-043-AMC-00172 (E)
Task DA-1P6-20901-A19902

Descriptors: (*Range finding, Optical equipment), (*Range finding, Pulse compression), Lasers, Atmosphere, Attenuation, Ultrasonic radiation, Transducers, Cadmium compounds, Sulfides, Quartz, Data processing systems, Light pulses, Signal-to-noise ratio, Coding, Water vapor, Carbon dioxide, Light transmission, Demodulators, Photoelectric cells (Semiconductor), Power amplifiers, Matched filters.

Progress on the optical/ultrasonic pulse compressor experimental breadboard is discussed. The major part of this period's effort has been devoted to optical correlation and pulse expansion. The highlights of this reporting period are: Improved diffusion layer transducers have been fabricated. Pulse encoding and expansion with a CdS-quartz ULM at 120 Mc has been obtained. Progress has been made on the pulse expansion-compression loop. The difference between pulse integration and the integration of the correlation process is explained in the system analysis. A practical comparison between a pulsed laser radar and a continuous wave (cw) laser radar is shown. A digest of the signal-to-noise advantage of pulse compression is given. A report on the effects of atmospheric attenuation is also included.

AD-641 492 **Field 20C, 11F**
Not available from CFSTI.
Illinois Univ., Urbana. Dept. of Physics.
ELECTRICAL RESISTIVITY OF THE SIMPLE METALS,
by Nathan Wiser. 23 Sep 65, 8p
Grant AF-AFOSR-328-63
Proj. AF-9761
Task 976101
AFOSR-66-1747
Availability: Published in The Physical Review v143 n2 p393-8 Mar 11 1966.

Descriptors: (*Metals, Resistance (Electrical)), Direct current, Determination.

A critical discussion is presented of the current status of the calculation of the dc electrical resistivity of simple metals. The general formalism, which has recently been given sound theoretical justification, shows that there are two elements to the calculation: (1) the dynamical structure factor, which describes the deviation of the ionic positions from perfect periodicity, and (2) the matrix elements of the screened electronion interaction. The first element can be obtained directly from experiment. The second element, the crux of the problem, has been calculated by a number of methods, including empirical means and the pseudopotential approach. These methods are shown to be inadequate for resistivity calculations because of the sensitivity of the electrical resistivity to the value of the matrix elements at large momentum transfers. It is demonstrated explicitly that the seemingly small errors present in pseudopotential calculations lead to errors as large as a factor of 2 in the electrical resistivity. (Author)

AD-641 631 **Field 20C, 20J, 20L**
Not available from CFSTI.
California Univ., Riverside. Dept. of Physics.
SPIN WAVES IN AN INTERACTING ELECTRON GAS.
Revised ed.,
by A. K. Rajagopal. 26 Aug 65, 13p
Grant AF-AFOSR-523-64
Proj. AF-9763
Task 976302
AFOSR-66-1558
Revision of manuscript submitted 4 Aug 65.
Availability: Published in The Physical Review v142 n1 p152-63 Feb 4 1966.

Descriptors: (*Nuclear spins, *Field theory), (*Electrons, Nuclear spins), Magnetism, Plasma medium, Integral equations, Green's function, Potential theory, Wave functions, Band theory of solids.

Identifiers: Bloch electrons, Spin waves, Yukawa potentials.

Some previous results of the author in collaboration with H. Brooks are improved and corrected concerning the coefficient of q sq. in the spin-wave dispersion law in an electron gas interacting according to a Yukawa potential. A variational method of solution for the integral equation occuring in this theory is given which, besides giving the spin-wave energy correctly, also gives the spin-density-wave instability when extended suitably. Having uncovered the instability of the paramagnetic state, an alternative derivation of the new state is given by a Green's-function method. In an Appendix, a theory of spin-density waves in a Bloch electron system is outlined. The variational method given here seems to be of quite general use in solving similar problems in other contexts. (Author)

AD-641 635 **Field 20C, 20J, 20L**
Not available from CFSTI.
California Univ., Riverside. Dept. of Physics.
SUPERCONDUCTING STATE OF AN ELECTRON GAS IN A HOMOGENEOUS MAGNETIC FIELD,
by A. K. Rajagopal, and R. Vasudevan. 16 Feb 66, 4p
Grants AF-AFOSR-523-64, AF-AFOSR-132-63
Proj. AF-9763
Task 976302
AFOSR-66-1492
Prepared in cooperation with California Univ., Berkeley. Dept. of Physics.
Availability: Published in Physics Letters v20 n6 p585-7 Apr 1 1966.

Descriptors: (*Superconductivity, *Electrons), Magnetic fields, Plasma medium, Quantum mechanics, Green's function, Differential equations, Band theory of solids.

The superconducting instability of an electron gas in a homogeneous magnetic field is investigated

taking full account of quantization effects using a variational method. A Ginsburg-Landau type equation with anisotropic field dependent effective masses is derived for the gap near the transition. (Author)

AD-641 637 **Field 20C, 20L**
Not available from CFSTI.
California Univ., Riverside. Dept. of Physics.
ENERGY DEPENDENCE OF THE OPTICAL POTENTIAL FOR ELECTRONS,
by Joseph Callaway, and Raymond K. M. Chow.
6 Dec 65, 8p
Grant AF-AFOSR-523-64
Proj. AF-9763
Task 976302
AFOSR-66-1485
Availability: Published in The Physical Review v145 n2 p412-8 May 13 1966.

Descriptors: (*Electrons, *Band theory of solids), (*Ferromagnetism, Theory), Crystal lattices, Molecular association, Potential theory, Matrix algebra, Atomic energy levels, Optical phenomena, Fermions.

An optical potential is constructed for a pair of electrons in a crystal interacting through short-range forces. A formal expression is obtained in the case of interactions at a single site but connecting an arbitrary number of bands. The energy dependence of this potential is determined from numerical calculations for electrons occupying a parabolic energy band. It is found that, regardless of the strength of the effective interaction, for a wide range of densities, the optical potential is nearly independent of energy, but is larger than predicted by a low-density expression which was previously obtained. These results are applied to the theory of ferromagnetism. (Author)

AD-641 638 **Field 20C, 20H, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
TRANSMISSION LINE MODELS OF MAGNON-PHONON MODES IN FERRITES. PART I. UNCOUPLED MODES.
Physical sciences research papers,
by James C. Sethares. Sep 66, 24p AFCRL-PSRP-262-Pt-1, AFCRL-66-633-Pt-1
Proj. AF-5635
Task 563503

Descriptors: (*Ferromagnetic materials, Quantum mechanics), Ferrites, Transmission lines, Models (Simulations), Equations of motion, Phonons, Nuclear spins, Analog systems, Polarization.

Identifiers: Magnons, Magnetoacoustics.

Transmission line models for describing the behavior of certain magnon-phonon modes in ferrites are developed. The analogies between magnon-phonon and transmission line variables apply to other modes as well. Models for circularly polarized shear waves and magnons are described in detail. Voltage and current variables are defined in terms of magnetic and mechanical variables and the distributed transmission line elements are related to 'material' parameters. Some examples of the use of the models are given. (Author)

AD-641 683 **Field 20C**
Not available from CFSTI.
Catholic Univ. of America, Washington, D. C.
APPLICATION OF THE MODIFIED BLOCH EQUATION TO THE LOW-TEMPERATURE BEHAVIOR OF THE HEISENBERG FERROMAGNET,
by Tomoyasu Tanaka, Kishin Moorjani, and Tohru Morita. 2 Jul 65, 12p
Grant AF-AFOSR-445-63
Proj. AF-9767
Task 976701
AFOSR-66-1548
Prepared in cooperation with Naval Ordnance Lab, White Oak, Md.
Availability: Published in The Physical Review v141 n1 p323-31 Jan 1966.

Descriptors: (*Ferromagnetism, Equations), Nuclear spins, Field theory, Hamiltonian, Special functions (Mathematical), Matrix algebra, Green's function, Wave functions.

Identifiers: Heisenberg ferromagnet.

An equation for the normalized density matrix is given. The equation can be used to obtain a hierarchy of equations for the reduced density matrices as well as that for average values of dynamical quantities. The latter set of equaticns is used to study the low-temperature behavior of the Heisenberg ferromagnet. (Author)

AD-641 759 **Field 20C**
Not available from CFSTI.
Western Reserve Univ., Cleveland, Ohio.
RESISTANCE IN THE INTERMEDIATE STATE OF TYPE I SUPERCONDUCTORS,
by B. S. Chandrasekhar, I. J. Dinewitz, and D. E. Farrell. 22 Jan 66, 4p
Grant AF-AFOSR-565-64
Proj. AF-9763
Task 976302
AFOSR-66-1493
Supported in part by NSF.
Availability: Published in Physics Letters v20 n4 p321-2 Mar 1 1966.

Descriptors: (*Superconductors, Cryogenics), Transport properties, Voltage, Vortices, Superconductivity.

It has recently been suggested that the potential difference observed in the intermediate state is due to the motion of vortices. In this letter the conditions under which such voltages can appear in type I materials are discussed. (Author)

AD-641 761 **Field 20C**
Not available from CFSTI.
Western Reserve Univ., Cleveland, Ohio.
NONLINEAR FLUX FLOW IN TYPE-II SUPERCONDUCTORS,
by D. E. Farrell, I. Dinewitz, and B. S. Chandrasekhar. 8 Nov 65, 7p
Grant AF-AFOSR-565-64
Proj. AF-9763
Task 976302
AFOSR-66-1519
Availability: Published in Physical Review Letters v16 n3 p91-4 Jan 17 1966.

Descriptors: (*Superconductors, Cryogenics), Lead alloys, Indium alloys, Magnetic properties, Experimental data, Transport properties, Superconductivity.

The resistance was measured as a function of current for superconducting type-II lead-indium alloys over a wide range of current, temperature, composition, pinning strength, and applied magnetic field.

AD-641 773 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
HEISENBERG MODEL WITH LONG RANGE INTERACTION.
Revised ed.,
by Colin J. Thompson. 13 May 65, 8p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1520
Revision of manuscript submitted 6 Apr 65.
Availability: Published in Journal of Physics and Chemistry of Solids v26 p1977-81 1965.

Descriptors: (*Ferromagnetism, Theory), Nuclear spins, Transformations, Mathematical models, Transition temperature, Integrals, Statistical functions, Field theory.

Identifiers: Heisenberg ferromagnet, Ising ferromagnet.

The functional Integral method as used by Siegert in his study of the Ising Model with long range interaction, is generalized and applied to the Heisenberg model. Above the Bragg-Williams Curie point, the functional integral expression for the partition function is evaluated by a saddle point approximation. This gives us an expansion in powers of the reciprocal range of the interaction which is essentially identical with the Ising Model result, in agreement with Brout who used a ring summation approximation. The expansion is not valid through the Curie point, and in its present form, this method seems to be incapable of giving spin waves. (Author)

AD-641 774 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
PHASE TRANSITION OF A TWO-DIMENSIONAL CONTINUUM-ISING MODEL,
by Colin J. Thompson. 28 Jun 65, 5p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 076101
AFOSR-66-1853
Availability: Published in Journal of Mathematical Physics v7 n3 p531-4 Mar 1966.

Descriptors: (*Ferromagnetism, Theory), (*Nuclear spins, Ferromagnetism), Crystal lattices, Statistical distributions, Transformations, Specific heat, Statistical functions, Mathematical models.

Identifiers: Ising ferromagnet.

A plane two-dimensional Ising model is decorated by placing on each bond of the lattice a continuum spin which is allowed to interact only with the Ising spins at the ends of the bonds. The continuum spins are chosen to be either Gaussian (i.e., normally distributed with zero mean and unit variance) or spherical (i.e., constrained to lie on the surface of a sphere) after Berlin and Kac, and by integrating out the continuum spins, the partition function of the decorated lattice is expressed in terms of the Onsager partition function of the plane two-dimensional Ising model. (Author)

AD-641 775 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
EFFECT OF THE SUHL-ABRIKOSOV RESONANCE ON THE TRANSITION TEMPERATURE OF SUPERCONDUCTORS,
by Allan Griffin. 20 Sep 65, 6p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1552
Availability: Published in Physical Review Letters v15 n17 p703-6 Oct 25 1965.

Descriptors: (*Superconductors, Transition temperature), (*Paramagnetic materials, Superconductivity), Impurities, Resonance, Electric currents, Electrons, Scattering.

A report is given of work involving the influence of anomalous electronic scattering (Kondo effect) on the transition temperature of superconducting paramagnetic alloys.

AD-641 776 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.

STRONG-COUPLING LIMIT IN DILUTE ALLOYS,
by Colin J. Thompson. 23 Aug 65, 6p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1553
Availability: Published in The Physical Review v14 n2 p479-82 Jan 1966.

Descriptors: (*Ferromagnetism, *Nuclear spins), Alloys, Band theory of solids, Solid solutions, Impurities, Antiferromagnetism, Transition temperature.

Identifiers: Coupling (Electromagnetic).

The energy spectrum was obtained and the partition function was calculated for Zener's s-d exchange-interaction model in the strong-coupling limit and with constant interaction-J/N between impurity ions and conduction electrons. The system is shown to undergo a transition to an ordered state independently of the sign of J and for arbitrarily small impurity concentration. (Author)

AD-641 777 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
GROUND STATE OF CORRELATED ELECTRONS IN A NARROW ALMOST HALF-FILLED S BAND,
by Yosuke Nagaoka. 21 Oct 65, 7p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1551
Availability: Published in Solid State Communications v3 p409-12 Oct 1965.

Descriptors: (*Ferromagnetism, *Band theory of solids), Electrons, Ground state, Special functions (Mathematical), Nuclear spins, Polarization, Crystal structure.

Consideration is given to a system of conduction electrons in an almost half-filled s band with an infinitely strong delta-function type repulsive potential, and with nonvanishing transfer matrix elements only between nearest neighbors. It was found that the totally polarized ferromagnetic state is the ground state for sc and bcc and for fcc and hcp with Ne>N, Ne and N being respectively the number of electrons and atoms, and that it is not the ground state for fee and hcp with Ne<N. (Author)

AD-641 778 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
DEPAIRING EFFECTS IN ROTATING SUPERCONDUCTORS,
by A. Griffin. 23 Feb 66, 6p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1643
Availability: Published in Journal Solid State Communications v4 p245-7 1966.

Descriptors: (*Superconductors, *Band theory of solids), Magnetic fields, Rotation, Superconductivity, Cryogenics, Transition temperature, Nuclear spins.

Maki's discussion of the depairing effects of persistent currents and magnetic fields is used to study a rotating superconducting cylindrical film. (Author)

AD-641 781 **Field 20C**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
ENTROPY TRANSPORT BETWEEN TWO SUPERCONDUCTORS BY ELECTRON TUNNELING.
Interim rept.,
by Kazumi Maki, and Allan Griffin. 5 Nov 65, 11p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1550
Document includes Appendix, Some Further Remarks on Entropy Transport Between Two Superconductors by Electron Tunneling.
Availability: Published in Physical Review Letters v15 n24 p921-3 Dec 13 1965.

Descriptors: (*Superconductors, Heat transfer), Entropy, Tunneling (Electronics), Transport properties, Metals.

The letter reports some preliminary calculations of this tunneling heat current. R depends very much on whether the metals are in the superconducting or normal phases. In addition there is an oscillatory heat flux due to fluctuations in the quasiparticle tunneling between two superconductors. The change in chemical potential due to the temperature difference T can give rise to the ac and dc Josephson supercurrents. However, calculations show that no entropy is carried by these currents, which is in agreement with one's physical expectations. (Author)

AD-641 782 **Field 20C, 20H, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
ENERGY GAP IN SPHERICAL NUCLEI,
by Colin J. Thompson, and Yeshwant R. Waghmare. 28 May 65, 7p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1655
Availability: Published in Nuclear Physics v77 n2 p477-80 1966.

Descriptors: (*Superconductivity, *Band theory of solids), (*Nuclei, Band theory of solids), Special functions (Mathematical), Nuclear particles, Nuclear forces, Nuclear energy levels.

The superconducting energy gap equation for a sphere of radius a and for a delta function interaction is solved and the results are compared with observed nuclear pairing energies by choosing a so that the volume of the sphere is the same as that of the given nucleus. (Author)

AD-641 783 **Field 20C, 20L, 20J**
Not available from CFSTI.
California Univ., San Diego, La Jolla. Dept. of Physics.
EXACT SOLUTION OF THE ONE-PARTICLE MODEL OF EXCHANGE SCATTERING IN SOLIDS.
Interim rept.,
by H. Suhl. 2 Aug 65, 8p
Grant AF-AFOSR-610-64
Proj. AF-9761
Task 976101
AFOSR-66-1534
Availability: Published in The Physical Review v141 n2 p483-8 Jan 1966.

Descriptors: (*Superconductivity, *Band theory of solids), Electrons, Electric currents, Scattering, Nuclear spins, Moments, Quantum mechanics, Cryogenics.

Identifiers: Unitarity.

A solution of the Chew-Low equations describing exchange scattering of conduction electrons is presented, which is exact within the one-particle intermediate-state approximation. This solution shares with earlier, approximate ones the feature that for antiferromagnetic exchange the spin-flip scattering amplitude can develop complex poles on the physical sheet. To examine this point further, the theory is generalized to an interaction of finite range, analyticity in momentum transfer being assumed and spin-orbit coupling being neglected. This still does not guarantee removal of the complex poles. However, the forward-scattering amplitude appears to be free from poles in all these cases. Unitarity is satisfied in the appropriate zero temperature limit. (Author)

AD-641 789 **Field 20C, 20L, 7D**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
SUPERCONDUCTIVITY OF BARIUM TUNGSTEN BRONZE,
by A. R. Sweedler, J. K. Hulm, B. T. Matthias, and T. H. Geballe. 1 Sep 65, 3p
Grant AF-AFOSR-631-64
Proj. AF-9760
Task 976002
AFOSR-66-1289
Prepared in cooperation with Westinghouse Research Labs., Pittsburgh, Pa., and Bell Telephone Labs., Inc., Murray Hill, N. J.
Availability: Published in Physics Letters v19 n2 p82 Oct 1 1965.

Descriptors: (*Superconductors, Tungstates), (*Tungstates, Superconductivity), (*Barium compounds, Superconductivity), Salts, Crystal structure, Carriers (Semiconductors), Crystal lattices.

Identifiers: Barium tungsten bronzes, Tungsten bronzes.

Barium tungsten bronze (BaxWO3) was prepared and found superconducting at a temperature of 1.9K. This is the first bronze with an alkaline earth metal substitute to be found superconducting. The crystal structure is isomorphous to the tetragonal I structure of the sodium tungsten bronze, which is also superconducting. The perovskite phase of the sodium tungsten bronze (NaxWO3) with x = .3, .4, .8, was also measured to .3K, and no superconductivity was found. (Author)

AD-641 790 **Field 20C, 11B**
Not available from CFSTI.
Arizona State Univ., Tempe. Dept. of Physics.
ELECTRICAL CONDUCTION BY OXYGEN IONS IN CERIUM OXIDE,
by E. L. Holverson, and C. J. Kevane. 17 Dec 65, 6p
Grants AF-AFOSR-609-64, AF-AFOSR-609-65
Proj. AF-9763
Task 976302
AFOSR-66-1846
Availability: Published in The Journal of Chemical Physics v44 n10 p3692-6 May 15 1966.

Descriptors: (*Ceramic materials, Conductivity), (*Cerium compounds, Oxides), Oxygen, Ions, Mass spectroscopy, Direct current, Calcium, Doping, Single crystals, Voltage, Transients.

Oxygen gas was observed by means of a mass spectrometer to be evolved from calcium-doped ceramic oxide when direct current was passed through it at 450C. The applied voltage necessary to cause the electrolysis was about 100 V across a sample 4 mm long containing 0.86 at. % calcium. When voltages of 1.0 V or less were applied to ceramic and single-crystal samples there were pronounced transients and nonlinear potential distributions. These latter effects appear to be consistent with a picture of oxygen ions migrating to an electrode where they are at least partially blocked. (Author)

AD-641 793 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla.

THE OCCURRENCE OF SUPERCONDUCTIVITY IN SULFIDES, SELENIDES, TELLURIDES OF Pt-GROUP METALS.
Interim rept.,
by Ch. J. Raub, V. B. Compton, T. H. Geballe, B. T. Matthias, and J. P. Maita. 24 Jun 65, 10p
Grant AF-AFOSR-631-64
Proj. AF-9760
Task 976002
AFOSR-66-1295
Prepared in cooperation with Bell Telephone Labs., Inc., Murray Hill, N. J.
Availability: Published in The Journal of Physics and Chemistry of Solids v26 p2051-7 1965.

Descriptors: (*Superconductors, *Platinum compounds), (*Palladium compounds, Superconductors), (*Sulfides, Superconductivity), (*Selenides, Superconductivity), (*Tellurides, Superconductivity), Transition temperature, Band theory of solids, Crystal structure, Specific heat, Cryogenics, Ruthenium compounds, Iridium compounds.

Superconductivity was discovered in Pd compounds with Se and Te, in IrTe3 and in PtTe. The superconducting transition temperature of a Pd-Se alloy containing 85 to 87 at.% Pd is 0.66K which is unusually high for its valence-electron concentration. A homogeneity range exists for the hexagonal B8 sub 1-type compound PdTe and for the trigonal C6-type compound PdTe2. The results of the low temperature heat capacity measurements of PdTe and PdTe 1.04 show that the large change in the transition temperature with composition is accompanied by a large change in the linear heat capacity coefficient. (Author)

AD-641 796 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
ELECTRON DENSITY AND ELECTRONIC PROPERTIES IN NOBLE-METAL TRANSITION ELEMENTS.
Interim rept.,
by M. Anthony Jensen, B. T. Matthias, and K. Andres. 24 Nov 65, 4p
Grant AF-AFOSR-631-64
Proj. AF-9760
Task 976002
AFOSR-66-1297
Availability: Published in Science v150 n3702 p1448-50 Dec 10 1965.

Descriptors: (*Transition elements, *Superconductivity), (*Band theory of solids, Transition elements), Magnetic properties, Transition temperature, Electron density, Alloys, Crystal lattices, Crystal structure.

Identifiers: Magnetic susceptibility.

It is shown empirically that the superconducting transition temperature as well as the magnetic susceptibility and the electronic specific heat of noble-metal transition elements and alloys can be described reasonably well as universal functions of the valence electron density, that is, the number of valence electrons per cubic centimeter. (Author)

AD-641 799 **Field 20C, 11F**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
SUPERCONDUCTING TRANSITION TEMPERATURES OF MERCURY-ALKALINE EARTH METAL COMPOUNDS,
by T. Claeson, and H. L. Luo. 29 Dec 65, 7p
Grant AF-AFOSR-631-64
Proj. AF-9763
Task 976302
AFOSR-66-1823
Availability: Published in J. Phys. Chem. Solids v27 p1081-5 1966.

Descriptors: (*Superconductors, Transition temperature), (*Mercury alloys, Superconductivity), (*Magnesium alloys, Superconductivity), (*Barium alloys, Superconductivity), (*Calcium alloys, Superconductivity), Alkaline earth metals, Intermetallic compounds, Cryogenics.

The superconducting transition temperatures of several Hg-Mg metallic compounds were determined. The critical temperature decreases monotonically with increasing Mg content, and shows no apparent crystal-structure dependence. An attempt has thus been made to extrapolate to the transition temperature of pure Mg. This procedure yields an estimate (rather uncertain) of between 1 and 0.01K for the T sub c of pure Mg. The transition temperatures of Hg2Mg, HgMg, Hg3Mg5, HgMg2 and HgMg3 fall in the range 4.0-0.16K. The critical temperatures of a few compounds of Hg with Ba and Ca have also been measured above 1.25K. (Author)

AD-641 801 **Field 20C, 11F**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
SUPERCONDUCTIVITY OF BETA-URANIUM,
by B. T. Matthias, T. H. Geballe, G. W. Hull, Jr., J. C. Ho, and D. K. Wohlleben. 1966, 3p
Grant AF-AFOSR-631-64
Proj. AF-9760
Task 976002
AFOSR-66-1323
Prepared in cooperation with Bell Telephone Labs., Murray Hill, N. J., and California Univ., Berkeley.
Availability: Published in Science v151 n3713 p985-6 Feb 25, 1966.

Descriptors: (*Uranium, Superconductivity), Cryogenics, Transition temperature.

The beta-phase of uranium, stabilized by small amounts of other metals, has been found to undergo the superconducting transition at temperatures close to 0.8K. This result casts severe doubt on previously reported results concerning the superconductivity of alpha-uranium, the phase stable at room temperatures. (Author)

AD-641 802 **Field 20C, 11F**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
SUPERCONDUCTIVITY IN THE ALLOY SYSTEM CADMIUM-MERCURY AND THE EFFECT OF ORDERING UPON SUPERCONDUCTIVITY,
by T. Claeson, H. L. Luo, and M. F. Merriam. 2 Aug 65, 8p
Grant AF-AFOSR-631-64
Proj. AF-9763
Task 976302
AFOSR-66-1549
Availability: Published in The Physical Review v141 n1 p412-8 Jan 1966.

Descriptors: (*Superconductors, Transition temperature), (*Cadmium alloys, Superconductivity), (*Mercury alloys, Superconductivity), Solubility, Phase studies, Atomic structure, Transformations.

The superconducting transition temperatures of Cd-Hg alloys covering the complete composition range have been determined. The solubility of Cd in Hg has been accurately determined; it is 1.5 plus or minus 0.25 at.% at 193K. The terminal solid solubility of Hg in Cd is found to be 26 plus or minus 2 at.% at 418K. Boundaries of the omega phase occur at 88 plus or minus 1 at.% Hg at 193K and at 35 plus or minus 2 at.% Hg at 383K. Ordering occurs in the intermediate omega phase at compositions based on Cd2Hg and CdHg2. The effect of ordering upon the superconducting transition temperature is observed for the first time. The transition temperature for the ordered phase is lower than the one for the disordered. This is presumably caused either by a reduced electron-phonon interaction, which is reflected also in a lower measured normal-state resistivity of the ordered phase, or by changed in the electronic density of states at the Fermi surface, which would be expected as a consequence of the subdivision of the Brillouin zones by the superlattice formation. (Author)

AD-641 803 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
PRESSURE DEPENDENCE OF THE SUPERCONDUCTING TRANSITION TEMPERATURE OF URANIUM,
by T. F. Smith, and W. E. Gardner. 21 Jun 65, 5p
Grant AF-AFOSR-631-64
Proj. AF-9760
Task 976002
AFOSR-66-1317
Availability: Published in Physical Review v140 n5A pA1620-3 Nov 29 1965.

Descriptors: (*Superconductivity, Transition temperature), (*Uranium, Superconductivity), Transition temperature, Pressure, Isotopes, Cryogenics, Atomic energy levels.

The superconducting transition temperature Tc of uranium was observed to increase from 1.0 to 2.3K on the application of a pressure of 10kbar. From this result the possibility that Tc will increase with isotopic mass has been suggested. (Author)

AD-641 812 **Field 20C, 20L**
Not available from CFSTI.
California Univ., San Diego, La Jolla.
PRESSURE DEPENDENCE OF THE SUPERCONDUCTING TRANSITION TEMPERATURE OF VANADIUM AND NIOBIUM,
by W. E. Gardner, and T. F. Smith. 8 Nov 65, 6p
Grant AF-AFOSR-631-64
Proj. AF-9763
Task 976302
AFOSR-66-1338
Availability: Published in Physical Review v144 n1 p233-6 Apr 8 1966.

Descriptors: (*Vanadium, Superconductivity), (*Niobium, Superconductivity), (*Superconductivity, Transition temperature), Pressure, Calorimetry, Thermal expansion, Cryogenics, Isotopes.

The pressure dependence of the superconducting transition temperature Tc of vanadium and niobium was studied up to a maximum pressure of 10 kbar. The observed values are compared with values calculated from calorimetric and thermal-expansion data. A possible explanation of the observed variation in the sign of the pressure dependence of Tc in the transition-metal superconductors is offered. (Author)

AD-641 992 **Field 20C, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Physics.
STUDIES OF FILMS IN THE SUPERCONDUCTIVE AND NORMAL PHASES.
Rept. no. 16 (Final), 1 Jul 62-30 Jun 66,
by Bernard Serin. Nov 66, 15p
Contract DA-36-029-sc-90821
Proj. DA-200-14501-B11B
ECOM-90821-F

Descriptors: (*Superconductivity, *Metal films), Superconductors, Phase studies, Intermetallic compounds, Magnetic fields, Alloys, Temperature, Hardness, Thermal conductivity.

The current carrying capacity of double layer films consisting of two different superconductors was studied. After aging (which probably entails the formation of intermetallic compounds), an intermediate zone displayed 'hard superconductor' behavior. It was for the first time demonstrated that a magnetic field perpendicular to a superconducting film penetrates the film spotwise, each spot

containing one quantum of magnetic flux. This effect was studied with alloy films of varying composition to determine how the Ginzburg-Iandau parameter of the superconductor changes with temperature. This parameter roughly indicates the 'hardness' of a superconductor and thus its technical usefulness. The thermal conductivity of films was studied to clarify the behavior of the electronic system as a function of temperature and of the magnetic field. (Author)

N66-37811 **Field 20C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
A SUPERCONDUCTING MAGNETIC BOTTLE.
by W. D. Coles, and J. C. Laurence. 1965, 19p
NASA-TM-X-52115
Presented At The Cryog. Eng. Conf., Houston, Tex., 23-25 Aug. 1965

Descriptors: *Magnetic coil, *Superconducting magnet, Bottle, Coil, Construction, Design, Field, Magnetic, Mirror, Physics, Plasma.

For abstract, see STAR 04 23.

AD-641 549 **See Field 20L**

AD-641 550 **See Field 20L**

AD-641 551 **See Field 20L**

AD-641 760 **See Field 20B**

AD-641 915 **See Field 20L**

AD-641 917 **See Field 20L**

AD-641 918 **See Field 20L**

N66-38342 **See Field 20I**

PB-173 382 **See Field 10A**

20D. FLUID MECHANICS

AD-447 732 **Field 20D, 13J**
Not available from CFSTI.
Office of Naval Research, Washington, D. C.
FOURTH SYMPOSIUM ON NAVAL HYDRODYNAMICS. PROPULSION HYDROELASTICITY, AUGUST 27-31, 1962, Washington, D. C.,
by Bennett L. Silverstein. 1962, 1116p ACR-92
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $6.75.

Descriptors: (*Hydrodynamics, Symposia), (*Marine propulsion, Ships), (*Elasticity, Fluid dynamic properties), Propellers (Marine), Airfoils, Hydrofoils, Variable-pitch propellers, Cavitation, Marine surface propulsion, Underwater propulsion, Vibration, Flutter, Compressible flow, Incompressible flow, Deformation.

Identifiers: Hydroelasticity.

The two topics covered in the symposium are (a) propulsion of ships and (b) hydroelasticity.

AD-468 762 **Field 20D**
CFSTI Prices: HC$3.60 MF$0.50
Rice Univ., Houston, Tex.
THREE-DIMENSIONAL CONFIGURATIONS OF MINIMUM TOTAL DRAG IN NEWTONIAN FLOW,
by David G. Hull. 1965, 33p AAR-5
Grant AF-AFOSR-828-65

Descriptors: (*Hypersonic flight, Drag), (*Drag, Hypersonic flight), Wing-body configurations, Aerodynamic configurations, Hypersonic characteristics, Hypersonic flow, Partial differential equations, Numerical analysis, Wings, Fuselages.

Variational problems associated with three-dimensional configurations (wings, bodies, and wing-body combinations) are considered, and the minimum drag problem is solved under the assumption that the base area and the wetted area are given while the length and the volume are free. The following hypotheses are employed: the configuration has two planes of symmetry; the angle of attack and the sideslip angle are zero; the pressure distribution is that pertaining to Newtonian flow; and the friction coefficient is constant. (Author)

AD-483 292 **Field 20D**
CFSTI Prices: HC$3.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE PERFORMANCE OF LOW THRUST (0.05 N) VENTURI NOZZLES.
Technical rept.,
by B. P. Day. Nov 65, 38p TR-65250

Descriptors: (*Nozzles, Performance (Engineering)), Thrust, Venturi tubes, Great Britain, Propanes, Pressure, Design.

An account is given of experiments to determine the performance under transient and steady state conditions of a 0.05 Newtons thrust nozzle for use with propane gas. It is shown that, with the inclusion of viscous effects in the flow equations, which is necessary at low thrust levels, the nozzle achieved the design performance at the operating plenum chamber pressure, but at lower pressures the performance deteriorated. (Author)

AD-641 340 **Field 20D**
CFSTI Prices: HC$6.00 MF$1.25
Massachusetts Inst. of Tech., Cambridge. Hydrodynamics Lab.
WAVE REFLECTION AND TRANSMISSION IN OPEN CHANNEL TRANSITIONS.
Final rept.,
by E. L. Bourodimos, and A. T. Ippen. Aug 66, 216p Rept. no. 98, R66-34
Contract Nonr-1841 (59)

Descriptors: (*Water waves, Hydrodynamics), Incompressible flow, Wave transmission, Transformations.

Identifiers: Gravity waves.

The topics are a theoretical development and an experimental investigation of the transformation of water-wave characteristics in the reflection and transmission processes through channel transitions of varying geometry, connecting two prismatic channels of constant cross section. The theoretical developments are based on small amplitude linearized wave theory in an inviscid, homogeneous and incompressible fluid. Two theoretical aspects were treated: (1) The wave amplitude variation in a channel of constant width for a bottom of arbitrary configuration was obtained for the various characteristics of the oncoming waves. Reflection and transmission coefficients were derived for shallow water waves for gradual channel transitions. The experimental part of the report is concerned with the determinations of reflection and transmission coefficients and of the energy relations including dissipation. Experimental relations were also found with regard to wave steepness, a factor which cannot be theoretically dealt with so far in channel transitions. (Author)

AD-641 343 **Field 20D**
CFSTI Prices: HC$1.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
SUPERSONIC FLOW OF AIR AROUND CORNERS,
by M. Lotkin. May 51, 14p BRL-757
Proj. TB3-0108

Descriptors: (*Supersonic flow, Tables), Air, Mathematical analysis.

Identifiers: Prandtl-Meyer expansion, Curved flows.

Problems arising in the field of supersonic aerodynamics frequently involve 'Prandtl-Meyer' flows. These flows permit exact mathematical solutions, and tables describing such flows are available. However, most of these tables suffer from one defect or another. Thus, some of them are based on a value of gamma of 1.4, which is not sufficiently accurate for many investigations. Others are either not extensive or accurate enough. In the table care was taken to avoid most of these major defects; the calculations are based on gamma = 1.405, and they were carried out with an accuracy deemed satisfactory for most purposes. (Author)

AD-641 349 **Field 20D**
CFSTI Prices: HC$25.20 MF$1.25
Ballistic Research Labs., Aberdeen Proving Ground, Md.
TABLES OF SUPERSONIC FLOWS ABOUT CONE CYLINDERS. PART II. COMPLETE FLOWS,
by R. F. Clippinger, J. H. Giese, and W. C. Carter. Aug 50, 256p BRL-730
Proj. TB3-0108H
See also PB-169 223.

Descriptors: (*Cylindrical bodies, Supersonic flow), (*Conical bodies, Supersonic flow), (*Supersonic flow, Tables), Statistical data, Velocity, Axially symmetric flow, Shock waves.

Cylindrical coordinates and velocity components were tabulated at points of a characteristic net for a family of steady, nonviscous, axisymmetric, irrotational supersonic flows about cone cylinders with semi cone angles of 5k degrees (1 or = k < or = 10) and free stream Mach numbers 1.3, 1.5, 1.7, 2.0, 3.0, 4.0, 5.0, and 7.0. (Author)

AD-641 396 **Field 20D, 8E**
CFSTI Prices: HC$3.00 MF$0.50
California Univ., Berkeley. Hydraulic Engineering Lab.
PHOTOGRAMMETRIC DEFINITION OF A WAVE SURFACE.
Tecnical rept.,
by Francis H. Moffitt. Sep 66, 51p HEL-12-3
Contract DA-49-055-CIVENG-65-5

Descriptors: (*Photogrammetry, *Water waves), Surfaces, Wake, Ship models, Feasibility studies.

The purpose of the present study is to determine the feasibility of applying the stereo photogrammetric method to the measurement of the wake of a ship model produced in a towing tank and in a model basin.

AD-641 434 **Field 20D, 22B, 1C**
CFSTI Prices: HC$5.00 MF$1.00
Maryland Univ., College Park. Dept. of Aerospace Engineering.
AEROSPACE ENGINEERING 1966,
by Joseph A. Schetz. Sep 66, 159p
Grant AF-AFOSR-1151-66
Proj. AF-9783
Task 978302
AFOSR-66-1943
The Proceedings of a Conference held at the Univ. of Maryland, March 15, 1966.

Descriptors: (*Aerospace craft, Engineering), (*Aerodynamics, Aerospace craft), Control systems, Optimization, Plasma physics, Geophysics, Astrophysics, Propellants, Axially symmetric flow, Jets, Injection, Supersonic flow, Chemical reactions, Symposia.

Contents: The tenth minta Martin lecture, 'Applications of optimal control theory in aerospace engineering', by Arthur E. Bryson, Jr; 'Plasmas in geophysics and astrophysics', by Fred S. Singer; 'Fluid control theory', by Joseph M. Kirshner; 'Solid propellant ignition and response of combustion to pressure transients', by Guenther von Elbe; 'A brief review of research on the impingement of axially symmetric free jets', by Coleman duP. Donaldson; 'Chemical non-equilibrium effects on high speed flow', by Freeman K. Hill; 'A study of tangetial slot injection in supersonic flow', by Harold E. Gilreath, Joseph A. Schetz.

AD-641 435 **Field 20D**
CFSTI Prices: HC$4.00 MF$1.00
Delaware Univ., Newark. Dept. of Chemical Engineering.
SHOCKTUBE STUDIES OF GAS-LIQUID REACTIONS AND OF GAS-PHASE DIFFUSION.
Annual rept. 1 May 64-31 Jul 65,
by John R. Ferron, and Patrick G. Dunham. Oct 65, 129p
Contract AF 33 (615)-1770
Proj. AF-7360
Task 736001
AFML-TR-65-416

Descriptors: (*Gases, *Diffusion), Shock tubes, Liquids, Molecules, Carbon dioxide, Absorption, Gas ionization, Argon, Nitrogen, Oxygen, Air, Helium, Carbon monoxide, High-temperature research, Transport properties.

A shocktube technique is described for determination of molecular diffusivities of gases containing carbon-dioxide for wide ranges of temperature and pressure. A shock wave moves through the test gas and reflects from a thin film of liquid triethanolamine on the endwall of the shocktube. Partial pressure of carbon dioxide is rapidly increased by the shock wave, and it absorbs and ionizes in the liquid. Rate of absorption, from which the gas-phase diffusivity can be deduced, is observed by following electrical conductivity of the liquid solution. Development of the method and preliminary results for binary mixtures of carbon dioxide with argon, nitrogen, oxygen, air, helium and carbon monoxide are reported. Temperatures of 300K to 2300K and pressures of 0.4 to 5.7 atm are employed. Experimental results do not yet have desired precision, and accuracy of the data analysis also needs to be increased. Methods for obtaining these improvements are discussed. (Author)

AD-641 439 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
A STABILITY ANALYSIS OF SUPERPOSED FLUIDS,
by Din-Yu Hsieh. Sep 66, 30p Rept. no. 85-35
Contract Nonr-220 (28)

Descriptors: (*Fluid flow, Stability), Viscosity, Gravity, Incompressible flow, Linear systems, Fluid dynamic properties.

An analysis is made of the stability of two fluid layers in the gravity field. The upper layer is incompressible, inviscid and of infinite extent. The lower layer is incompressible, viscous and bounded below by a rigid plane. Both fluids are moving in the same direction parallel to the interface. It is found that the controlling mechanism for instability is of the Rayleigh-Taylor type which is inherent in inviscid flows. The main effect of viscosity is to diminish the rate of growth of the disturbances while the presence of linear shear flow in the lower layer has a tendency to stabilize the system. (Author)

AD-641 441 **Field 20D**
Not available from CFSTI.
Michigan Univ., Ann Arbor. Dept. of Mathematics.
GENERAL THEORY OF SIMPLE WAVES IN RELAXATION HYDRODYNAMICS,
by N. Coburn. 1964, 34p
Grant AF-AFOSR-20-63
Proj. AF-9749
Task 974901
AFOSR-66-1507
Availability: Published in Journal of Mathematical Analysis and Applications v11 n1-3 p102-30 Jul 1965.

Descriptors: (*Hydrodynamics, Theory), (*Gas flow, Partial differential equations), Mechanical waves, One-dimensional flow.

Sufficient conditions are determined for existence of simple waves in one-dimensional, non-steady, non-magnetic, relaxation hydrodynamics. The theory is applied to the flow of a dissociating gas. For proper given data, the Cauchy problem is shown to possess a solution with two branches for any unitial manifold of class C (1). (Author)

AD-641 484 **Field 20D, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Propulsion Lab.
AN INVESTIGATION OF THE RHEOLOGY OF GELS,
by Joel H. Blatt, and Barry D. Allan. 22 Aug 66, 22p
Proj. DA-18223001A20300
AMC-RA-RK-TR-66-15

Descriptors: (*Gels, *Rheology), Test equipment, Design, Viscosimeters, Standards, Stresses, Measurement.

The report describes work accomplished on the rising sphere rheometer and efforts to develop a standard gel to be used for interlaboratory comparisons both on the rising sphere and on the Brookfield viscometer. The construction details and wiring for the rheometer and an optical method for checking the rate of rise are presented. It was found that the accuracy of the rheometer could be greatly improved by expanding and displaying the output scale on a Leeds and Northrup recorder. Several batches of a 'standard' gel (0.15-percent Carbopol 940 in water) were tried but gave inconsistent results with this rheometer, as well as not giving consistent densities. The results of these tests seem to indicate that Carbopol 940 is not suitable as a component in standard gels, if unsophisticated mixing methods are to be used. In addition, Cabosil (2 concentrations tried), Methocell 90HG-D65 (3 concentrations tried), and Cellosize 5229-JJ were tried with water all mixed by hand shaking. All samples failed to demonstrate reasonable yield values or settled on standing. (Author)

AD-641 540 **Field 20D**
Not available from CFSTI.
Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
SLIP FLOW OF LINEARIZED COUETTE PROBLEM.
Revised ed.,
by Young-Ping Pao. 15 Nov 65, 5p
Grant AF-AFOSR-815-65
Proj. AF-9749
Task 974901
AFOSR-66-1198
Revision of manuscript submitted 17 May 65.
Availability: Published in The Physics of Fluids v9 n2 p409-11 Feb 1966.

Descriptors: (*Couette flow, *Knudsen number), Asymptotic series, Integral equations, Errors.

Identifiers: Slip flow.

An asymptotic solution, valid throughout the physical space, is obtained for the linearized Couette problem at small Knudsen number. The error introduced by this solution is of the order of (1/alpha) exp (- (1/beta)alpha 2/3) where (1/alpha) is the Knudsen number and beta is any real number greater than unity. (Author)

AD-641 681 **Field 20D, 20J**
Not available from CFSTI.
Texas Univ., Austin.
ROTATING FLUID MASSES IN GENERAL RELATIVITY,
by R. H. Boyer. 12 Aug 64, 6p
Grant AF-AFOSR-454-63
Proj. AF-9749
Task 974901
AFOSR-66-1412
Prepared in cooperation with Liverpool Univ. (England).
Availability: Published in Proc. Camb. Phil Soc v61 p527-30 1965.

Descriptors: (*Fluids, Rotation), (*Gravity, Fluids), Relativity theory, Pressure, Density, Velocity, Boundary layer, Great Britain.

Some properties are derived of the gravitational field of an isolated, axially symmetric, uniformly rotating mass of perfect fluid in a steady state, according to the general theory of relativity. The question under study is whether a perfect fluid interior can be matched to any given exterior field. The main results exhibit the class of all possible fluid boundaries, given the exterior field, and some relations between the pressure, density, 4-velocity, and interior metric tensor.

AD-641 712 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AN EXPERIMENTAL INVESTIGATION OF MIXING HIGH TEMPERATURE AIR WITH AMBIENT BYPASS AIR BY UPSTREAM INJECTION,
by J. R. Henson, and C. E. Simmons. Nov 66, 40p
AEDC-TR-66-146
Contract AF 40 (600)-1200
Projs. AF-7778, ARO-PL3535
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Supersonic flow, Injection), Secondary flow, Nozzles, Thermodynamics, Instrumentation, Air.

A mixing chamber employing upstream injection of the secondary airflow was designed and tested in conjunction with a Mach 4.0 nozzle. Mixing chamber configurations with total length to maximum diameter ratios of 1.7 and 2.3 were investigated. The mixer was designed for a secondary to primary mass flow ratio of 2.57 and a primary to stilling chamber pressure ratio of 4.78. A uniform temperature profile with not more than 5 percent variation at the exit of the Mach 4.0 nozzle was required. The mixing chamber was experimentally investigated at secondary to primary mass flow ratios of 0.86 to 2.70. The primary mass flow ranged from 0.99 to 1.5 lb/sec at temperatures from 1730 to 2240R, depending upon the heater flow rate. The secondary flow temperature was approximately 470R. Temperature and pressure profiles obtained in the mixing chamber and 0.5 in. downstream of the Mach 4.0 nozzle exit substantiated satisfactory mixer performance. (Author)

AD-641 715 **Field 20D**
Not available from CFSTI.
Vanderbilt Univ., Nashville, Tenn. Dept. of Physics.
FLOW MODES IN ELECTRIC SHOCK TUBES,
by J. P. Barach, and R. E. Vermillion. 11 Jun 65, 11p
Grants AF-AFOSR-287-63, AF-AFOSR-287-64
Proj. AF-9767
Task 976703
AFOSR-66-1259
Availability: Published in Physics of Fluids v8 n11 p1976-84 Nov 1965.

Descriptors: (*Shock tubes, *Gas flow), Plasma medium, Shock waves, Flow separation.

Three modes of plasma flow in a low pressure electric shock tube were studied. A diffusion type flow occurs below 10 microns initial pressure. Flow with a separated shock front ahead of the usual single liminous front is found to occur for high initial pressures, large distances downstream or lower Mach numbers. The separated shock front is found to occur when it is stable against Taylor interchange with the driver, brought on by flow deceleration. Calculations based on a simple blast-wave model give agreement with the experimental data. (Author)

AD-641 730 **Field 20D, 20J**
Not available from CFSTI.
Texas Univ., Austin. Dept. of Physics.
A VARIATIONAL PRINCIPLE FOR A ROTATING RELATIVISTIC FLUID,
by R. H. Boyer, and R. W. Lindquist. 25 Jan 66, 5p
Grant AF-AFOSR-454-64
Proj. AF-9749
Task 974901
AFOSR-66-1236
Prepared in cooperation with Liverpool Univ. (England). and Wesleyan University, Middleton, Conn.
Availability: Published in Physics Letters v20 n5 p504-6 Mar 15 1966.

Descriptors: (*Fluids, Rotation), Momentum, Gravity, Relativity theory, Baryons, Great Britain, Energy, Axially symmetric flow.

Requiring the total energy of a time-independent axially-symmetric relativistic fluid to be stationary, keeping fixed the total angular momentum and baryon-number, it was found that the fluid must be isentropic and in uniform rotation. (Author)

AD-641 841 **Field 20D**
Not available from CFSTI.
Rensselaer Polytechnic Inst., Troy, N. Y.
NONLINEAR ASPECTS OF INSTABILITY IN FLOW BETWEEN ROTATING CYLINDERS,
by R. C. DiPrima, and J. T. Stuart. 1964, 8p
Supported in part by ONR and NSF. Prepared in cooperation with National Physical Lab., Teddington (England).
Availability: Published in Proceedings of the International Congress of Applied Mechanics (11th), Munich (Germany) 1964 p1037-44.

Descriptors: (*Cylindrical bodies, Fluid flow), (*Fluid flow, Stability), Nonlinear systems, Mathematical models, Vortices, Great Britain.

Mathematical models are presented in an analysis of the stability of Taylor-vortex motion.

AD-641 842 **Field 20D, 7D, 14B, 13K K**
Not available from CFSTI.
Naval Ship Engineering Center, Philadelphia, Pa.
REPRESENTATIVE RESEARCH PAPERS OF THE APPLIED PHYSICS DEPARTMENT.
Aug 66, 213p
Availability: Published in Reprints from various journals.

Descriptors: (*Boilers, Marine engineering), (*Steam, *Fluid mechanics), Temperature, Measurement, Globe valves, Pipes, Orifices, Flowmeters, Thermometers, Thermal analysis, Fluid flow, Strain gages, Nozzles, Transducers, Cleaning, Maintenance.

Contents: Measurement accuracy requirements for boiler testing; Measurement of temperatures in high-velocity steam; Experimental evaluation of expansion factors for steam; Effect of a globe valve in approach piping on orifice meter accuracy; Problems in measuring steam flow at 1250 PSIA and 950 F with nozzles and orifices; Power test code thermometer wells; Two-phase flow measurement with orifices; A practical method of determining response time of thermometers in liquid baths; Steady-state thermal analysis of a thermometer well; Performance characteristics of elbow flowmeters; The critical flow function for superheated steam; ASME research on high pressure-high temperature steam and water flow measurement; Tables for the interpolation and extrapolation of ASME coefficients for square-edged concentric-orifices; A rational equation for ASME coefficients for long-radius flow nozzles employing pipe wall taps at 1D and 1/2D; Encapsulated strain gage for use in steam environment; System to calibrate vibration transducers at low displacement; Chemical cleaning of naval boilers as a maintenance method; Factors that must be considered for successful chemical cleaning as experienced in naval boilers.

AD-641 856 **Field 20D, 13A, 13K**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
ON OPERATION OF PUMPS AND BLOWERS UNDER REDUCED FEED REGIMES.
ATD work assignment no. 88,
by V. I. Polikovskii, and A. A. Levin. 28 Jul 66, 14p ATD-66-94
TT-66-62587
O Rabote Nasosov i Vozdukhoduvnykh Mashin na Rezhimakh Ponizhennykh Podach, trans. of Teploenergetika (USSR) v12 n10 p71-4 1965.

Descriptors: (*Pumps, Fluid flow), (*Blowers, Fluid flow), (*Fluid flow, Angle of attack), USSR, Operation, Impellers, Vortices, Skin friction.

The mechanism of the process of liquid flow towards a rotor under reduced feed regimes is examined. A postulate is introduced for maintaining the angle of attack of the incoming flow under these regimes. The solution of this problem permits a rational approach to optimizing a number of the geometric parameters of impellers, presently determined on the basis of far-fromprecise, purely experimental recommendations. (Author)

AD-641 886 **Field 20D, 20M**
Not available from CFSTI.
Massachusetts Inst. of Tech., Cambridge.
RADIATION COUPLED WEDGE FLOWS.
Interim rept.,
by Martin Jischke. 25 Feb 66, 5p
Grant AF-AFOSR-641-64
Proj. AF-9782
Task 978201
AFOSR-66-1731
Revision of manuscript submitted 25 Oct 65.
Availability: Published in AIAA Journal v4 n7 p1300-2 Jul 1966.

Descriptors: (*Wedges, Shock waves), (*Shock waves, Two-dimensional flow), Thermal radiation, Optical properties, Heat transfer.

A relatively simple analysis of a two-dimensional wedge flow which illustrates the failure of the optically thin model for a radiation-coupled flow is presented. The limited range of applicability for the optically thin assumption is indicated. At some downstream location, the solution breaks down in the sense that the shock wave collapses and the temperature increases. This apparently results because of the absence of an equilibrium mechanism for the radiative transfer in the original equations, and is independent of the order of the approximation implied by the integral methods. (Author)

AD-641 888 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Naval Weapons Lab., Dahlgren, Va.
MEASURED VERSUS COMPUTED SURFACE WAVE TRAINS OF A RANKINE OVOID,
by A. V. Hershey. 7 Jun 66, 75p NWL-2036

Descriptors: (*Water waves, Geometric forms), Measurement, Mathematical analysis, Turbulent boundary layer, Wake, Ships.

Identifiers: Rankine ovoids.

Measured elevations in the wave train of a Rankine ovoid are compared with computed elevations for an ideal source and sink. The measured elevations are in phase with the computed elevations but have smaller amplitudes. The discrepancy in amplitude is attributed to turbulent boundary layer and wake in the flow around the real ovoid. (Author)

AD-641 901 **Field 20D**
CFSTI Prices: HC$5.00 MF$1.00
Lockheed-California Co., Burbank, Calif.
WINGED HULL - STABILITY AND CONTROL STUDY,
by W. A. Swope, J. F. Herman, M. L. Jager, and P. F. Bala. 2 Jul 64, 149p LR-17910
Contract NOw-63-0588

Descriptors: (*Aerodynamic configurations, Stability), Control, Ground effect, Hydrodynamics.

Identifiers: Winged hull.

The report presents an analysis of the stability, control, and response characteristics of a large airborne vehicle when flying close to a water surface. The effects of both smooth water and waves were considered. An analysis of water contact for a variety of conditions is also included.

AD-641 977 **Field 20D, 19A**
CFSTI Prices: HC$1.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
NOTE ON THE DETERMINATION OF THE FORM OF AIR SHOCKS FROM THE DECAY CURVE.
Memorandum rept.,
by Jane Dewey. Feb 52, 13p BRL-MR-598
Proj. TB3-0112J

Descriptors: (*Shock waves, Mathematical analysis), Equations, Pentolite, Pressure.

Expressions connecting the first derivative of the shock parameters just behind the front with the decay curves are given in the form convenient for comparison with experimental results, for plane, cylindrical and spherical shocks. Comparison of pressure-time gage measurements on 'spherical' shocks with the decay curve for shocks from spherical Pentolite charges is included. The discussion is preliminary to the determination of the form of the shock from these charges now being undertaken by integration of the hydrodynamic equations along the Kirkwood-Brinkley decay curve. (Author)

N66-32721 **Field 20D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
A THEORETICAL AND EXPERIMENTAL INVESTIGATION OF SECONDARY JETS IN A MACH 6 FREE STREAM WITH EMPHASIS ON THE STRUCTURE OF THE JET AND SEPARATION AHEAD OF THE JET.
by J. B. Barber, and J. R. Sterrett. 1966, 31p
NASA-TM-X-57137
Presented At The Agard Separated Flows Specialists Meeting, Brussels, 9-11 May 1966

Descriptors: *Flow separation, *Gas jet, *Hypersonic test apparatus, *Jet flow, *Secondary flow, Apparatus, Exhaust, Flow, Free, Gas, Hypersonic, Interferometer, Jet, Mach number, Model, Secondary, Separation,

Shock, Stream, Structure, Test, Tunnel, Wind.

For abstract, see STAR 04 19.

N66-32724 Field 20D
CFSTI Prices HC$2.50 MF$0.75
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
A STUDY OF SECONDARY INJECTION OF GASES INTO A SUPERSONIC FLOW.
by R. Rosen, F. W. Spaid, and E. E. Zukoski. 1 Aug 66, 86p NASA-CR-76891, JPL-TR-32-834
Contract NAS7-100

Descriptors: *Gas flow, *Secondary injection, *Supersonic flow, Argon, Distribution, Flow, Gas, Helium, Injection, Mach number, Mass, Model, Nitrogen, Pressure, Scale, Secondary, Shock, Sonic, Supersonic, Velocity, Wall.

For abstract, see STAR 04 19.

N66-32940 Field 20D
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
A REVIEW OF FACTORS AFFECTING BOUNDARY-LAYER TRANSITION.
by A. L. Braslow. Aug 66, 30p NASA-TN-D-3384

Descriptors: *Boundary layer transition, *Laminar flow, *Turbulent flow, Boundary, Factor, Flow, Fluid, Free, Gradient, Laminar, Layer, Mach number, Noise, Pressure, Ratio, Review, Stream, Surface, Temperature, Transition, Turbulent.

For abstract, see STAR 04 19.

N66-33022 Field 20D
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
ATTENUATION OF SINUSOIDAL DISTURBANCES IN NONVISCOUS LIQUID FLOWING IN A LONG LINE WITH DISTRIBUTED LEAKAGE.
by R. J. Blade, and C. M. Holland. Aug 66, 29p NASA-TN-D-3563
Contract 129-02-04-06-22

Descriptors: *Acoustic attenuation, *Flow distortion, *Leakage, *Nonviscous flow, Acoustic, Attenuation, Distortion, Distribution, Disturbance, Flow, Frequency, Line, Liquid, Nonviscous, Shunt, Sinusoid, Transmission.

For abstract, see STAR 04 19.

N66-33495 Field 20D
CFSTI Prices HC$2.50 MF$0.75
Louisiana State Univ., Baton Rouge. Div. Of Engineering Research.
FLOW LOSSES IN FLEXIBLE HOSE QUARTERLY PROGRESS REPORT NO. 4, MAR. 14 - JUN. 14, 1965.
by C. A. Whitehurst. Jun 66, 72p NASA-CR-65433
Contract NAS9-4630

Descriptors: *Airflow, *Computer program, *Data processing, *Flow rate, *Water flow, Air, Angle, Computer, Convolution, Empirical, Equation, Flexible, Flow, Fortran, Friction, Gas, Hose, Liquid, Loss, Method, Pressure, Program, Rate, Reynolds number, Water.

For abstract, see STAR 04 19.

N66-33686 Field 20D
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
MEASUREMENTS OF THE INTENSITY OF TURBULENCE IN A GAS FLOW BY THE THERMOELECTRIC METHOD.
Izmereniya Intensivnosti Turbulentnosti V Gazovom Potoke Termoelektricheskim Metodom
by A. I. Bannikov. Jun 66, 12p NASA-TT-F-10223
Transl. Into English From Energ. I Elektrotekhn. Prom. (Kiev), No. 3, 1964 P 32-33

Descriptors: *Gas flow, *Thermoelectricity, *Turbulence, Amplitude, Component, Diagram, Flow, Fluctuation, Gas, Measurement, Stagnation, Temperature, Thermocouple, U.s.s.r., Velocity.

For abstract, see STAR 04 19.

N66-33692 Field 20D
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
RECENT RESULTS IN THE STUDY OF PROBLEMS OF MIXING AND REATTACHMENT.
Resultats Recents Dans L'etude Des Problemes De Melange Et De Recollement
by P. Carriere, and M. Sirieix. Jun 66, 25p NASA-TT-F-10203
Transl. Into English Of The Xith Intern. Congr. On Appl. Mech. Held At Munich, 30 Aug. - 5 Sep. 1964 Onera T. P. No. 165

Descriptors: *Perturbation, *Separated flow, *Turbulent flow, Boundary, Conical, Flow, Fluid, Layer, Mechanics, Plane, Revolution, Separation, Turbulent.

For abstract, see STAR 04 19.

N66-33697 Field 20D
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
MOTION OF A RIGID BODY UNDER THE EFFECT OF ROTATION OF AN INTERNAL FLYWHEEL.
K Dvizheniyu Tverdogo Tela Pod Deystviyem Vrashcheniya Vnutrennego Makhovika
by B. A. Smolinikov. May 66, 13p NASA-TT-F-10139
Transl. Into English From Prikl. Mat. I Mekh. (Moscow), V. 28, No. 1, 1964 P 171-174

Descriptors: *Flywheel, *Rigid body, *Rotation, Angular, Axis, Body, Dimensional, Equation, Finite, Inertia, Internal, Kinetic, Magnitude, Momentum, Motion, Rigid, Three, Velocity.

For abstract, see STAR 04 19.

N66-33713 Field 20D
CFSTI Prices HC$2.50 MF$0.50
Avco Corp., Wilmington, Mass. Research And Advanced Development Div.
FLOW FIELD COMPUTER PROGRAM FINAL REPORT.
by G. Waldman. 22 May 64, 54p NASA-CR-65434, RAD-TR-64-17
Contract NAS9-2494

Descriptors: *Aerodynamics, *Blunt body, *Flow field, *Mathematical model, *Perfect gas, Air, Angle of attack, Axisymmetry, Blunt, Body, Computer, Equilibrium, Field, Flow, Gas, Machine, Mathematics, Perfect, Program.

For abstract, see STAR 04 19.

N66-33724 Field 20D
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
AN UNSTEADY THERMAL LAMINAR BOUNDARY LAYER ON A SEMI-INFINITE PLATE IN A VISCOUS FLOW.
Nestatsionarnyy Teplovoy Laminarnyy Pogranichnyy Sloy Na Polubeskonechnoy Plastinke, Obtekayemoy Vyazkoy Zhidkost'yu
by YU. L. Rozenshtok. Jun 66, 17p NASA-TT-F-10214
Transl. Into English From Izv. Akad. Nauk Sssr, Ser. Mekhan. (Ussr), No. 6, 1965 P 20-26

Descriptors: *Isothermal flow, *Laminar boundary layer, *Thermal boundary layer, *Viscous flow, Boundary, Dynamic, Flow, Formation, Front, Hydrodynamics, Incompressible, Isotherm, Karman-pohlhausen parameter, Laminar, Layer, Motion, Semiinfinite, State, Steady, Temperature, Thermal, Unsteady, Velocity, Viscous.

For abstract, see STAR 04 19.

N66-33972 Field 20D
CFSTI Prices HC$2.00 MF$0.50
Academia R. P. R., Bucharest. National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
AN ANALYSIS OF SUPERSONIC FLOW PHENOMENA IN CONICAL NOZZLES BY A METHOD OF CHARACTERISTICS.
by L. B. Callis. Aug 66, 52p NASA-TN-D-3550

Descriptors: *Conical nozzle, *Hypersonic flow, *Perfect gas, *Supersonic flow, Analysis, Axisymmetry, Calorie, Characteristics, Conical, Contour, Dimensional, Distortion, Flow, Formation, Function, Gas, Hypersonic, Inlet, Irrotational, Mach number, Method, Nozzle, One, Perfect, Profile, Shock, Stream, Supersonic, Wave.

For abstract, see STAR 04 19.

N66-33980 Field 20D
CFSTI Prices HC$3.00 MF$1.00
National Aeronautics And Space Administration, Washington, D. C.
ON THE QUESTION OF CALCULATION OF RADIATION IN ONE-DIMENSIONAL MOVEMENT OF MONATOMIC GAS.
Kuoprosu Ob Uchete Izlucheniya Pri Odnomernom Statsionarnom Dvizhenii Odnoatomnogo Gaza
by V. A. Prokofyev. Aug 66, 132p NASA-TT-F-10500
Transl. Into English From Sci. Record Of Moscow State Univ. (Ussr), V. 179, 1954 P 79-124

Descriptors: *Hydrodynamic equation, *Monatomic gas, *One-dimensional flow, *Radiation field, Calculation, Characteristics, Dimensional, Equation, Field, Flow, Gas, Hydrodynamics, Ionization, Monatomic, Movement, One, Radiation, Stream.

For abstract, see STAR 04 19.

N66-34071 Field 20D
CFSTI Prices HC$1.00 MF$0.50
Southwest Research Inst., San Antonio, Tex. Rept. Of Mechanical Sciences.
FUEL SLOSHING STUDIES QUARTERLY PROGRESS REPORT NO. 15, 1 OCT. - 31 DEC. 1965.
by H. N. Abramson. 8 Jan 65, 11p NASA-CR-77093
Contract NAS8-1555

Descriptors: *Fuel tank, *Pressure distribution, *Ring structure, *Sloshing, Angle, Baffle, Cylinder, Cylindrical tank, Distribution, Excitation, Fuel, Liquid, Phase, Pressure, Resonance, Ring, Structure, Tank, Torque.

For abstract, see STAR 04 19.

N66-38502 Field 20D
CFSTI Prices HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
EXPERIMENTAL INVESTIGATION OF A CONFINED, JET- DRIVEN WATER VORTEX.
by E. J. Roschke. 1 Oct 66, 50p NASA-CR-78550, JPL-TR-32-982
Contract NAS7-100

Descriptors: *Aspect ratio, *Reactor technology, *Vortex flow, Cavity, Core, Gas, Gaseous, Jet, Multiple, Pressure, Reactor, Static, Tube, Water.

For abstract, see STAR 04 23.

N66-38748 Field 20D
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
NONSTEADY LIQUID AND GAS FLOW WITH HEAT ADDITION AND SHOCK PERTURBATIONS.
by F. S. Sidransky, and M. M. Smith. Oct 66, 68p NASA-TN-D-3684
Contract 120-27-04-27-22

Descriptors: *Gas flow, *Heat gain, *Liquid flow, *Perturbation, *Unsteady flow, Characteristic, Computer, Diffuser, Equation, Method, Network, Numerical, Program, Shock, State, Supersonic.

For abstract, see STAR 04 23.

PB-173 453 Field 20D, 6P
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
WAVES IN FLUID-FILLED ELASTIC TUBES,
by John H. Olsen. Jun 66, 69p Pub-66-5
Grant PHS-HD-01288

Descriptors: (*Fluid mechanics, Pipes), (*Mechanical waves, Liquids), Elasticity, Blood circulation, Arteries, Motion, Laminar flow, Turbulence, Viscosity.

A theoretical and experimental study of large amplitude, long wave-length motions of a viscous liquid in long elastic tubes was performed. A one-dimensional model for the flow in which the tube wall moves only radially, and in which only longitudinal pressure gradients and fluid accelerations are important is presented. The effects of fluid viscosity are treated for both laminar and turbulent flow. The governing nonlinear equations are solved by several methods, and the solutions are compared with each other and with a set of accurate experimental data. The results indicate that nonlinear effects due to large amplitude motion are not as large as those found in similar problems in gas dynamics and water waves. (Author)

AD-275 107 See Field 1A

AD-456 624 See Field 20I

AD-641 403 See Field 8C

AD-641 532 See Field 12A

AD-641 708 See Field 13J

AD-641 714 See Field 14B

AD-641 721 See Field 12A

AD-641 851 See Field 5A

AD-641 986 See Field 14B

NBS-MP-280 See Field 8H

20E. MASERS AND LASERS

AD-457 119 Field 20E, 7D, 20L
CFSTI Price: HC$7.60
Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Progress rept. no. 8, 16 Sep-15 Dec 64,
by R. Novick. 15 Dec 64, 71p
Contracts DA-36-039-sc-90789, DA-28-043-AMC-00099 (E)

Descriptors: (*Masers, Rubidium), (*Atomic structure, Ionization), Polarization, Relaxation time, Dipole moments, Cesium, Hyperfine structure, Lithium, Scattering, Radioactive decay, Molecular structure, Microwave spectroscopy, Molecular beams, High-temperature research, Solid state physics, Nuclear magnetic resonance, Platinum, Radio astronomy, Planetary atmospheres, Superconductors.

A higher-mode, higher-Q, vacuum-tight cavity has been used to enable operation of the rubidium maser on field-independent transitions. The need for multiple bulky magnetic shields is thereby removed. The sensitivity to the ambient ac field is greatly reduced and the frequency and amplitude stability have been improved. Further study of the photon-echo phenomenon has established a rough upper limit of 50 nsec for the relaxation time of the echo at 14 K. The relation of the polarization of the echo to the polarization of the incident pulses was found to be in agreement with theoretical prediction. A Stern-Gerlach type of deflection experiment was carried out with metastable autoionizing atoms. Potassium atoms in a particular state were observed to be deflected by a short inhomogenous magnetic field. The resulting beam pattern was found to be consistent with the assigned J value of the mestastable state. An optical pumping experiment has been designed to check with high precision whether or not free atoms possess electric dipole moments. The existence of an electric dipole moment would imply a breakdown of time-reversal invariance in either the electromagnetic interactions or weak interactions or both. (Author)

AD-460 878 Field 20E, 20F
CFSTI Price: HC$2.00
Microwave Lab., Stanford Univ., Calif.
UNSTABLE OPTICAL RESONATORS FOR LASER APPLICATIONS.
Internal memo.,
by A. E. Siegman. Sep 64, 43p ML-1227
Contract AF 33 (615)-1411
Proj. DA-36-039SC-90839

Descriptors: (*Lasers, Resonators), (*Resonators, Lasers), Ruby, Mirrors, Curves profiles, Stability, Diffraction, Configuration.

Identifiers: Solid state lasers, Gas lasers.

A simple geometrical analysis was developed which describes the lowest-order transverse mode in an arbitrary unstable optical resonator of large fresnel number. The lowest mode is assumed to consist of two oppositely traveling spherical waves which uniformly illuminate the two end mirrors. The centers of curvature of these two waves (which are not in general the mirror centers of curvature) are found by requiring that each center be the image of the other upon reflection from the appropriate spherical end mirror. The resonator losses, found from simple geometrical considerations, are given by simple analytical expressions and are entirely independent of the mirror sizes. The equiloss contours on the usual mode chart are hyperbolae, the present results agree well with more exact results calculated by fox and li for the unstable case, and with experimental results on a ruby laser having a divergent spherical surface ground directly onto the ruby rod. Unstable resonators of this type appear potentially useful for transverse mode control and for diffraction output coupling. (Author)

AD-641 513 Field 20E, 20F
Not available from CFSTI.
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
A GLASS LASER COUPLING REFLECTOR,
by Charles A. Bennett. 1966, 11p
Proj. DA-1X132141D043
FA-A66-4
Availability: Published in Proceedings of the Symposium on the Arts of Glassblowing (11th), 6p, 1966.

Descriptors: (*Reflectors, *Lasers), Glass, Pipes, Design, Manufacturing methods, Optical equipment.

The design and fabrication of a glass laser reflector to be used as a coupling between light source and laser crystal is described. The reflector consists of a double walled jacket made with two concentric glass tubes and side ports sealed through to the interior for coolant fluid forming a closed body with a cooling chamber at the center. With a suitable solid material in the jacket, this assembly was found superior to other laser coupling reflectors. In the fabrication of the glass coupling reflector, the inner jacket is made of precision bore glass tubing sized to admit a xenon flash lamp and a laser rod assembly. The assembly, which houses the lamp and rod in a fixed position, is supported by two end plugs which are machined to fit the inner glass jacket and to form a closed chamber. The ring seal for the side ports also serve to join the inner and outer tube forming the jacket and keep these tubes concentric. The inner tube is also used as a coolant carrier for the xenon flash lamp. The sealed port holes are made of standard wall glass tubing. Coolant can be delivered at a rapid rate so that the flash lamp can be used in a rapid fire manner. Magnesium oxide is packed in the space between the inner and outer tubes to serve as a reflective material. (Author)

AD-641 876 Field 20E
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
BLEACHING MECHANISM OF ORGANIC PHOTOTROPIC SUBSTANCES USED IN RUBY LASERS AS SWITCHES,
by B. A. Ermakov, and A. V. Lukin. 26 Sep 66, 9p ATD-66-119
TT-66-62591
Mekhanizm Prosvetleniya Organicheskikh Fototropnykh Zatvorov dlya Rubinovykh OKG, trans. of Zhurnal Prikladnoi Spektroskopii (USSR) v4 n5 p410-4 1966. Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Lasers, *Photochromism), (*Shutters (Optics), Lasers), Organic compounds, Discoloration, Phthalocyanines, Complex compounds, Optical equipment components, Optical phenomena, Atomic energy levels, USSR.

Identifiers: Laser switches, Phototropic materials.

The bleaching process of organic phototropic switches under the effect of ruby laser emission was examined. The effect of the atomic constants of solutions on the bleaching process is evaluated. (Author)

N66-32757 Field 20E
CFSTI Prices HC$3.00 MF$0.75
Wheeler Labs., Inc., Great Neck, N. Y.
DEVELOPMENT OF OPTICAL WAVEGUIDES AND COMPONENTS PROGRESS REPORT NO. 1339, FEB. 1965 - MAR. 1966.
by E. R. Schineller, and D. W. Wilmot. 14 Apr 66, 113p NASA-CR-76893
Contract NAS-12-2

Descriptors: *Coupling, *Laser, *Waveguide, Communication, Component, Core, Dielec-

tric, Dioxide, Direction, Fuse, Mode, Optical, Pattern, Silicon, Slab, Slot, Solid, Tracking.

For abstract, see STAR 04 19.

N66-33372 Field 20E
CFSTI Prices HC$1.00 MF$0.50
Ohio State Univ., Columbus. Dept. Of Physics.
OPTICAL MASER PHOTON RATE GYROSCOPE.
by C. V. Heer. 1964, 12p NASA-CR-59820
Grant NSG-552
Presented At The Symp. On Unconventional Inertial Sensors, Farmingdale, N. Y., 19-20 Oct. 1964

Descriptors: *Maser resonator, *Optical gyroscope, *Resonant frequency, Algebra, Cavity, Design, Electromagnetic, Energy, Equation, Frequency, Gyroscope, Maser, Optics, Photon, Radiation, Rate, Refraction, Resonance, Shift.

For abstract, see STAR 04 19.

N66-33411 Field 20E
CFSTI Prices HC$2.00 MF$0.50
Ohio State Univ., Columbus. Dept. Of Physics.
AN EVALUATION OF THE OPTICAL MASER PHOTON RATE GYROSCOPE.
by C. V. Heer. 1964, 39p NASA-CR-59809.
Grant NSG-552
Presented At The Colloq. On Advan. Gyroscopes, Paris, 2-6 Nov. 1964, Sponsored By The Natl. Center Of Spatial Studies

Descriptors: *Cavity resonance, *Electromagnetic radiation, *Gyroscope, *Optical maser, *Resonant frequency, Cavity, Electromagnetic, Evaluation, Frequency, Maser, Mathematics, Optical, Photon, Radiation, Rate, Relation, Resonance, Rotation.

For abstract, see STAR 04 19.

N66-33688 Field 20E
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
REVIEW OF THE PRESENT SITUATION ON LASER RESEARCH.
Ubersicht Uber Die Derzeitige Situation Auf Dem Lasergebiet
by E. David. Jun 66, 27p NASA-TT-F-10201
Transl. Into English From Inst. Franco-allemand De Rech. De Saint- Louis (France), Note Tech. T 21/63, 2 Oct. 1963

Descriptors: *Gas laser, *Light modulator, *Solid state laser, Conference, Control, Decoupling, Differential, Emission, Energy, Equation, Excitation, External, Frequency, Function, Internal, Laser, Light, Modulation, Modulator, Nonlinear, Optical, Polarization, Radiation, Resonant, Semiconductor, Solid, Spike, State, Technology, Very high.

For abstract, see STAR 04 19.

N66-33863 Field 20E
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Electronics Research Center, Cambridge, Mass.
A NEW CLASS OF TRAPPED LIGHT FILAMENTS.
by R. Y. Chiao, E. Garmire, M. A. Johnson, S. Krinsky, and H. A. Smith. 1966, 25p NASA-TM-X-57831
Grant NSG-330, Contract AF 19/628/-4011

Descriptors: *Filament, *Laser output, *Light scattering, *Raman effect, *Ruby laser, Beam, Class, Frequency, Index, Intensity, Laser, Light, Output, Phase, Property, Radiation, Refraction, Ruby, Scattering, Stimulation, Threshold, Trap, Velocity.

For abstract, see STAR 04 19.

AD-641 339 See Field 5A

AD-641 498 See Field 20L

20F. OPTICS

AD-296 016 Field 20F
CFSTI Price: HC$9.60
Aeronutronic Div., Ford Motor Co., Newport Beach, Calif.
INFRARED RADIATION EMITTED BY HOT GASES AND ITS TRANSMISSION THROUGH SYNTHETIC ATMOSPHERES.
Annual technical rept.,
by Darrell E. Burch, and David A. Gryvnak. 31 Oct 62, 97p
Contract Nonr-3560 (00)

Descriptors: (*Carbon dioxide, Infrared radiation), (*Water vapor, Infrared radiation), (*Infrared radiation, Wave transmission), Gases, Emissivity, Heating, Absorption, Nitrogen, Flames.

Measurements of the infrared emission of CO2 and H2O near 3700/cm and near 2350/cm have been made at 900K, 1200K and 1500K with pressures varied between approximately 5 and 1500 mm Hg. Samples were contained in a sample cell 7.75 cm long and heated by molybdenum wire furnace. Investigations were made of absorption of radiation from hot CO2 by cold CO2 and compared with the absorption of radiation from a continuous source. Results of the measurements are presented in considerable detail in tables and figures. (Author)

AD-641 348 Field 20F
CFSTI Prices: HC$2.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A GENERALIZED VECTOR THEORY OF THE MACH-ZEHNDER INTERFEROMETER,
by F. D. Bennett, and G. D. Kahl. Apr 52, 23p
BRL-801
Proj. TB3-0108

Descriptors: (*Interferometers, Geometry), Theory, Configuration, Ellipsoids, Design.

The vector theory of the ideal, planar, Mach-Zehnder interferometer is extended to include three-dimensional models based on geometry of the ellipsoid. Necessary and sufficient conditions for production of white light fringes are determined, and the path difference formula governing interference is developed as in the planar case. Expressions for fringe width and orientation are found and the effects of various source points determined. The problem of optimum source is found reducible to that already treated for the planar interferometer. The effect of a thick plane-parallel plate on a parallel beam is studied. An actual thick plate interferometer is represented as an ideal, ellipsoidal interferometer with the effects of thick plates linearly superposed. Conditions are investigated for obtaining perfect plate compensation; these reduce the ellipsoidal interferometer to planar form. Tests for alignment of a thick plate instrument are suggested. Finally terms accounting for thick windows and compensating chambers are considered and requirements developed for compensation in the B.R.L. pressure-temperature controlled range. (Author)

AD-641 674 Field 20F, 11G
CFSTI Prices: HC$3.00 MF$0.75
ITT Industrial Labs., Fort Wayne, Ind.
ULTRAVIOLET GENERATOR STUDY.
Final rept. 1 Jul 65-30 Jun 66,
by T. E. Sisneros, and J. A. Davis. Sep 66, 71p
ITTIL-66-1043
Contract AF 30 (602)-3879
Proj. AF-5597
Task 559701
RADC-TR-66-497

Descriptors: (*Ultraviolet equipment, Generators), Phosphorescent materials, Luminescence, Cathode ray tubes, Aging (Materials), Ultraviolet radiation.

UV emitting cathodoluminescent phosphors were prepared and evaluated for emission wavelength, output power at high input power levels, aging characteristics, and decay time. Host materials studied were the zinc magnesium sulfide and several oxygen-dominated systems. A commercial P-16 phosphor was used as a standard against which the experimental samples were compated. Several lead-activated silicates were found to be superior to P-16 with respect to output power capability and aging characteristics. Ca3Si2O7:Pb with peak emission at 380 nm has output power at high input power equal to that of P-16 and equivalent or better aging characteristics. BaSi2O5:Pb with peak emission at 355 nm and BaZnSi4O10:Pb with peak emission at 305 nm have exhibited output power 25-50% higher than P-16 with superior aging characteristics. All of these materials have decay times (to the 1/e level) of 0.2-0.3 microsec which is about four times that of P-16. (Author)

AD-641 694 Field 20F, 7D, 20B
Not available from CFSTI.
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
TEMPERATURE DEPENDENCE OF INFRARED DISPERSION IN IONIC CRYSTALS LiF AND MgO.
Physical sciences research papers,
by J. R. Jasperse, A. Kahan, J. N. Plendl, and S. S. Mitra. Sep 66, 21p AFCRL-PSRP-271, AFCRL-66-661
Proj. AF-5621
Task 562105
Availability: Published in Physical Review v146 n2 p526-42 Jun 10 1966.

Descriptors: (*Infrared spectroscopy, Crystals), (*Lithium compounds, *Fluorides), (*Magnesium compounds, *Oxides), Infrared radiation, Reflection, Dielectric properties, Single crystals, Phonons.

Identifiers: Lithium fluoride, Magnesium oxides.

Infrared-reflectivity measurements were made from 200/cm to 800/cm at temperatures ranging from 7.5 to 1060K for LiF and from 8 to 1950K for MgO. The reflection spectra were analyzed by means of a two-resonance damped-oscillator model, and the calculated optical properties are presented. Dielectric dispersion theory is reviewed and it is shown that all the major theories discussed give identical results for the susceptibility when evaluated at the reststrahlen frequency but differ from one another at other frequencies. The damping constant for LiF and MgO in the high-temperature limit agrees reasonably well with the formula suggested by Maradudin and Wallis, but discrepancies seem to appear in the low-temperature limit. The general behavior of the extinction coefficient in the wings of the absorption region is consistent with the notion of continuous absorption produced by multiphonon processes. The shift of the long-wavelength optical-mode frequencies of LiF, MgO, and RbI with temperature is discussed in terms of the volume and other anharmonic effects. The anharmonic part of the frequency shift is found to agree qualitatively with the theory of Maradudin and Fein. (Author)

AD-641 729 Field 20F, 20N
Not available from CFSTI.
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
EXACT SOLUTION TO A LENS PROBLEM,

by C. Yeh. 20 Mar 65, 10p
Grant AF-AFOSR-496-64
Proj. AF-4751
AFOSR-66-0540
Availability: Published in Journal of the Optical Society of America v55 n7 p860-7 Jul 1965.

Descriptors: (*Electromagnetic waves, *Diffraction), (*Lenses, Diffraction), Special functions (Mathematical), Rayleigh scattering, Wave transmission, Dielectrics.

An exact solution is obtained for the diffraction of plane electromagnetic waves by an elliptic cylindrical lens surrounding an infinitely long parallel slit in a perfectly conducting plane. Results are expressed in terms of Mathieu functions. Approximate expressions for the expansion coefficients for the diffracted waves, the scattered intensity at infinity, and the transmission coefficients are also obtained in the long-wavelength (Rayleigh scattering) limit. Possible numerical investigations are discussed. (Author)

AD-641 815 **Field 20F**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
FOCAL PROPERTIES OF A PLANE GRATING IN A CONVERGENT BEAM,
by James T. Hall. Feb 66, 30p
Task 1P620901A199-05
ECOM-5034

Descriptors: (*Diffraction gratings, Focusing), Theory, Optical images, Energy, Mirrors, Detectors.

Focusing from a plane grating can be accomplished by using convergent radiation incident on the grating in such a manner that any incident angle and the resulting diffraction angle will be on the same side of the grating normal. The theory for the focal properties is developed by applying Fermat's principle of least time to selected terms resulting from a finite series expansion of the system's distance function. Derivations are given for finding the focal curve equation, astigmatism and coma, of the most usable configuration of the optical components. Discussions of the aberrations disclose methods for eliminating the astigmatism and reducing the coma. (Author)

N66-33178 **Field 20F**
CFSTI Prices HC$2.00 MF$0.50
National Bureau Of Standards, Washington, D. C.
ON THE USE OF THERMOPILES FOR ABSOLUTE RADIOMETRY IN THE FAR ULTRAVIOLET.
by R. G. Johnston, and R. P. Madden. 1964, 33p NASA-CR-64059
NASA ORDER R-73

Descriptors: *Far ultraviolet, *Radiometry, *Thermocouple, Absolute, Black, Detector, Effect, Ejection, Electron, Failure, Far, Gold, Photoelectric, Radiation, Reflection, Scattering, Sensitivity, Surface, Thermopile, Ultraviolet, Vacuum.

For abstract, see STAR 04 19.

N66-33377 **Field 20F**
CFSTI Prices HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C. E. O. Hulburt Center For Space Research.
POLARIZERS FOR THE EXTREME ULTRAVIOLET.
by W. R. Hunter. Aug 64, 22p NASA-CR-59934
NASA ORDER R-107
Presented At The Conf. On Phot. And Spectroscopic Optics, Tokyo And Kyoto, Japan, 1-8 Sep. 1964 Submitted For Publication

Descriptors: *Metal film, *Polarized radiation, *Ultraviolet reflection, Aluminum, Calculation, Coating, Extreme, Film, Fluoride, Glass, Gold, Lithium, Metal, Multilayer, Oxide, Physics, Polarization, Radiation, Reflection, Transmission, Ultraviolet, Zinc.

For abstract, see STAR 04 19.

N66-37640 **Field 20F**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
A NEW FOUR-CHANNEL SCANNING SPECTROMETER FOR BALLISTIC-RANGE RADIOMETRY.
by E. E. Whiting. 1964, 9p NASA-TM-X-57935

Descriptors: *Ballistic range, *Radiometry, *Scanning device, *Spectrometer, Calibration, Design, Intensity, Multichannel, Resolution, Spectral, Wavelength.

For abstract, see STAR 04 23.

N66-38142 **Field 20F**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
THE EFFECTS OF A GEMINI LEFT-HAND WINDOW ON EXPERIMENTS REQUIRING ACCURACY IN SIGHTING OR RESOLUTION.
by M. B. Davis, T. M. Walsh, and D. N. Warner Jr. Oct 66, 29p NASA-TN-D-3669
Contract 125-17-02-09-00

Descriptors: *Gemini spacecraft, *Optical property, *Resolution, *Sight line, *Window, Accuracy, Angle, Angular, Configuration, Deviation, Effect, Environment, Experiment, Flatness, Glass, Left, Photography, Simulation, Space, Wedge.

For abstract, see STAR 04 23.

N66-38363 **Field 20F**
CFSTI Prices HC$2.00 MF$0.50
Geophysics Corp. Of America, Bedford, Mass. Technology Div.
PLASMA BEAM CALIBRATION MASS SPECTROMETER.
by W. P. Poschenrieder. Jun 65, 26p NASA-CR-68258
Contract NAS5-9513

Descriptors: *Atom concentration, *Mass spectrometer, *Molecular ion, *Plasma composition, Calibration, Contamination, Density, Design, Filament, Frequency, Gas, Gun, Height, Hydrogen, Low energy, Measurement, Nitrogen, Oxygen, Peak, Radio, Ratio, Source, Test.

For abstract, see STAR 04 23.

N66-38780 **Field 20F, 14C**
CFSTI Prices HC$1.00 MF$0.50
Max-planck-institut Fur Physik Und Astrophysik, Munich (West Germany).
PHOTOELECTRIC RECORDING DEVICE OF HIGH SENSITIVITY AND ACCURACY FOR SPECTROGRAPHS.
Photoelektrisches Spektrographen-registrier- Photometer Hoher Empfindlichkeit Und Praezision
by C.-R. Vidal. May 66, 18p MPI-PAE/P1-30/66
In German

Descriptors: *Multiplier, *Photoelectric apparatus, *Spectral line, Accuracy, Battery, Cooling, Infrared, Intensity, Liquid nitrogen, Peltier effect, Sensitivity, Spectrograph, Ultraviolet.

For abstract, see STAR 04 23.

AD-460 878 **See Field 20E**

AD-641 513 **See Field 20E**

AD-641 787 **See Field 20B**

AD-641 851 **See Field 5A**

N66-38060 **See Field 20B**

20G. PARTICLE ACCELERATORS

PB-173 402 **Field 20G**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDE THEORIQUE ET EXPERIMENTALE DE LA FOCALISATION DES IONS AFIN D'AMELIORER, LA BRILLANCE DU FAISCEAU IONIQUE PAR LA SUPPRESSION DES CAUSES D'ABERRATION (Theoretical and Experimental Study of Ion Focusing Systems in Order to Improve the Ion Beam Brightness by Suppressing Aberration Causes).
Doctoral thesis in French,
by Jean Faure. 1966, 73p CEA-R-3002
Text in French; attached summary in English.

Descriptors: (*Ion beams, Focusing), (*Electromagnetic lenses, Ion beams), Ion sources, Brightness, Anodes, Electrostatics, Ion accelerators, France.

A study was undertaken to show that a beam brightness can be improved by an order of magnitude when the sources of aberrations are suppressed in the anode region source, as well as in the extraction region and in the electrostatic focusing system. A calculation was set up to determine a simple focusing system. The aberration ratio due to this focusing system is smaller than 10 to 15 per cent. The experimental study developed: (a) an ion source and its extraction system capable of producing an aberration free beam at an energy of 20 keV; (b) an accelerating unit up to 190 keV that confirms that the qualities of a 35 mA beam produced by the said ion source are not spoiled when the beam goes through the focusing and accelerating system that have been designed to be aberration free. (Author)

20H. PARTICLE PHYSICS

AD-442 497 **Field 20H**
CFSTI Price: HC$9.60
Stanford Univ., Calif. Stanford Electronics Labs.
BAND STRUCTURE AND ELECTRON-ELECTRON INTERACTIONS IN COPPER AND SILVER-PHOTOEMISSION STUDIES.
Technical rept.,
by C. N. Berglund. Jun 64, 100p TR-5205-1, SU-SEL-64-053
Contract SD-87

Descriptors: (*Copper, Nuclear properties), (*Silver, Nuclear properties), (*Photoelectric effect, Theory), Reviews, Inelastic scattering, Experimental data, Excitation, Nuclear resonance, Electron transitions, Monte Carlo method, Phototubes, Energy, Work function, Hamiltonian, Elastic scattering.

Photoemission studies are used to determine in detail many of the electronic properties of the metals copper and silver over an energy range from the bottom of the d-band to 11.5 ev above the Fermi level. Measurements of the spectral distribution of the quantum yield and of the energy distribution of photoemitted electrons from copper and silver under monochromatic radiation are described and interpreted in terms of the energy-band structure of the metals and the inelastic-scattering mechanisms for energetic electrons. The effects on the photoemission measurements of direct and indirect optical transitions, electron-electron scattering, lifetime broadening, and the Auger process

are described. These processes are identified in the experimental data, and used to obtain information on the density of states, the effect of matrix elements, the optical selection rules, the mean free paths for scattering of energetic electrons, and the energy loss per scattering event in both copper and silver. (Author)

AD-467 464 **Field 20H**
CFSTI Prices: HC$4.60 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
GAMMA RAYS RESULTING FROM INTERACTIONS OF 14.7 MeV NEUTRONS WITH MAGNESIUM, ALUMINUM, CALCIUM, TITANIUM AND IRON,
by W. E. Thompson, and F. C. Engesser. 3 Jun 65, 44p USNRDL-TR-861

Descriptors: (*Gamma ray cross sections, Measurement), (*Neutron reactions, Metals), Inelastic scattering, Iron, Magnesium, Aluminum, Calcium, Titanium, Gamma rays, Neutron scattering, Excitation, Atomic energy levels.

The prompt gamma rays resulting from the interaction of 14.7 MeV neutrons with the nuclei of the elements magnesium, aluminum, calcium, titanium and iron, have been investigated. Cross sections for the production of many of these gamma rays have been measured by observing them with a carefully shielded detector during neutron bombardment of a given elemental sample. It is found that the n,n alpha process predominates and that gamma rays resulting from the deexcitation of the lowest energy levels, with one or two notable exceptions, are generally most prominent. Other processes including n,p gamma, n,alpha, and n,d gamma are also observed. Some of the most important gamma rays are found to have the following elemental production cross sections (in millibarns per steradian at 90 deg): 1.37 MeV gamma ray from Mg, 30.9 + or - 3.1; 1.81 MeV gamma ray from Al, 13.7 + or - 2.0; 3.73 MeV gamma ray from Ca, 9.0 + or - 1.4; 0.99 MeV gamma ray from Ti, 51.9 + or - 5.2; and 0.85 MeV gamma ray from Fe, 57.6 + or - 5.8. (Author)

AD-467 464 **Field 20H**
CFSTI Prices: HC$4.60 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
GAMMA RAYS RESULTING FROM INTERACTIONS OF 14.7 MeV NEUTRONS WITH MAGNESIUM, ALUMINUM, CALCIUM, TITANIUM AND IRON,
by W. E. Thompson, and F. C. Engesser. 3 Jun 65, 44p USNRDL-TR-861

Descriptors: (*Gamma ray cross sections, Measurement), (*Neutron reactions, Metals), Inelastic scattering, Iron, Magnesium, Aluminum, Calcium, Titanium, Gamma rays, Neutron scattering, Excitation, Atomic energy levels.

The prompt gamma rays resulting from the interaction of 14.7 MeV neutrons with the nuclei of the elements magnesium, aluminum, calcium, titanium and iron, have been investigated. Cross sections for the production of many of these gamma rays have been measured by observing them with a carefully shielded detector during neutron bombardment of a given elemental sample. It is found that the n,n' gamma process predominates and that gamma rays resulting from the deexcitation of the lowest energy levels, with one or two notable exceptions, are generally most prominent. Other processes including n,p,gamma, n,alpha,gamma and n,d,gamma are also observed. Some of the most important gamma rays are found to have the following elemental production cross sections (in millibarns per steradian at 90 deg): 1.37 MeV gamma ray from Mg, 30.9 plus or minus 3.1; 1.81 MeV gamma ray from Al, 13.7 plus or minus 2.0; 3.73 MeV gamma ray from Ca, 9.0 plus or minus 1.4; 0.99 MeV gamma ray from Ti, 51.9 plus or minus 5.2; and 0.85 MeV gamma ray from Fe, 57.6 plus or minus 5.8. (Author)

AD-641 387 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Ballistić Research Labs., Aberdeen Proving Ground, Md.
INDEX OF REFRACTION OF EXCITED MONATOMIC GASES.
Memorandum rept.,
by R. A. Rudd. Jul 66, 20p BRL-MR-1772
Proj. RDT/E-1P222901A201

Descriptors: (*Plasma medium, *Refractive index), Gases, Atomic energy levels, Excitation, Argon, Polarization, Interferometers.

The average polarizability per particle is formulated for an excited monatomic gas. In contrast to the usual procedure of neglecting excited state contributions, a lower bound is obtained considering only atomic excited states. The result shows that for an equilibrium argon plasma previous values of the effective polarizability may be too small by at least a factor of two. (Author)

AD-641 449 **Field 20H**
Not available from CFSTI.
Mellon Inst., Pittsburgh, Pa.
POWER SERIES REPRESENTATION OF GENERALIZED OSCILLATOR STRENGTHS,
by Edwin N. Lassettre. 16 Jun 65, 10p
Grant AF-AFOSR-61-63
Proj. AF-9767
Task 976702
AFOSR-66-1261
Availability: Published in The Journal of Chemical Physics v43 n12 p4479-86 Dec 15 1965.

Descriptors: (*Power series, *Electron transitions).

Identifiers: Oscillator strengths.

Expansion of generalized oscillator strengths in powers of the momentum change K (of the colliding electron) generally leads to series with finite radii of convergence. From a study of singularities of the function for complex values of K it is possible to transform the series into one which converges for all physically attainable values of K. The transformation depends on the ionization potential and the excitation energy, both of which can be determined experimentally. The transformed series should be useful in fitting experimental data and in the extrapolation of oscillator strengths. It is especially useful, however, when applied to transitions for which a few terms of the series in inverse powers of K can be obtained. The mere determination of the degree of the first nonvanishing term in the inverse power series in enough to severely restrict the form of series and, in fact, to sum the first six terms. These terms, which involve only one adjustable constant, fit the experimental data to within 3.5% and the deviation is mainly due to experimental error. (Author)

AD-641 463 **Field 20H, 18B**
CFSTI Prices: HC$2.00 MF$0.50
Instituto de Investigacion Aeronautica y Espacial, Buenos Aires (Argentina). Laboratorio de Radiaciones.
QUEERNESSES IN THE DEFORMATION CHART.
Interim rept. 15 Mar 66-15 Mar 67,
by S. M. Abecasis, H. E. Bosch, and C. A. Heras. Jul 66, 28p LR-13
Grant DA-ARO-49-092-66-G121
Proj. DA-20014501B11B-00-005-LA

Descriptors: (*Barium, *Nuclear structure), (*Nuclear energy levels, Barium), Isotopes, Nuclear models, Deformation, Nuclear isomers, Argentina.

The structure of the excited levels in some neutron-deficient barium isotopes is described. A comparison between the results experimentally obtained by different authors and those theoretically predicted by several nuclear models is performed. The character of the collective transitional region to which belong these nucleides is thoroughly discussed, relation is made with the competition between spherical and deformed shapes in different regions of the deformation chart. (Author)

AD-641 467 **Field 20H, 4A, 7D**
Not available from CFSTI.
Massachusetts Univ., Amherst.
REORIENTATION OF H ATOMS BY PROTON IMPACT.
Revised ed.,
by Edward A. Soltysik. 27 Sep 65, 4p
Grant AF-AFOSR-218-63
Proj. AF-9767
Task 976701
AFOSR-66-1596
Revision of manuscript submitted 20 Aug 65.
Availability: Published in The Physical Review v142 n1 p72-3 Feb 1966.

Descriptors: (*Hydrogen, *Proton bombardment), Atomic energy levels, Excitation, Scattering, Emissivity, Polarization, Momentum.

The scattering amplitude in Born approximation is presented for the reorientation of H atoms by proton impact. A hydrogen atom originally in the state designated by the quantum numbers (n0l0m0) may have its m quantum number altered through an impact with a proton. The results presented in this paper show that the scattering amplitude for this reorientation depends not only upon the magnitude of the momentum-transfer vector, but also upon its direction with respect to the axis of quantization. It is suggested that this effect may be observable by measuring the change in the polarization of the emitted radiation as a function of the momentum of the proton. (Author)

AD-641 490 **Field 20H, 20J**
Not available from CFSTI.
Falkiner Nuclear Dept., Univ. of Sydney (Australia).
ISOBAR PRODUCTION IN HIGH-ENERGY NUCLEAR INTERACTIONS,
by L. S. Peak, and R. L. S. Woolcott. 9 Nov 65, 17p
Grant AF-AFOSR-305-63
Proj. AF-9751
Task 975104
AFOSR-66-1502
Prepared in cooperation with Cornell Univ., Ithaca, N. Y.
Availability: Published in Il Nuovo Cimento ser10 v42 p856-70 Apr 21 1966.

Descriptors: (*Nuclear reactions, *Nuclear isobars), Proton reactions, Energy, Decay schemes, Nuclear resonance, Mesons, Nuclear particles, Australia.

For nucleon-nucleon collisions at a median energy of 5000 GeV, the median fraction of the energy released by the fireball process was measured as KF= 0.25 plus or minus 0.03. Also the total fraction of energy released by the interaction was determined as K=0.45 +0.05 or -0.10. The significant discrepancy is attributed to the release of energy by the isobar decay process. (Author)

AD-641 533 **Field 20H, 18H**
Not available from CFSTI.
Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
NEW SPIN AND MIXING RATIO DETERMINATIONS FOR THREE LEVELS IN 60Ni,
by S. M. Shafroth, and G. T. Wood. 1966, 8p
Grant AF-AFOSR-401-63
Proj. AF-9751
Task 975102
AFOSR-66-1503
Availability: Published in Nuclear-Spin Parity Assignments p193-5 1966.

Descriptors: (*Nickel, *Nuclear spins), (*Copper, *Decay schemes), Gamma emission, Proton bombardment, Correlation techniques, Nuclear energy levels.

Several spin assignments for nickel-60 were made based on gamma-gamma angular correlation measurements following the decay of copper-60. The results resolve a descrepancy between results previously obtained by this method (Levine, et al., Z. Phys. v151 p241 1958) and those obtained by the energy averaging (p,p' gamma) gamma-ray angular distribution method (Mohindra and Van Patter, Phys. Rev. v139 pB274 1965). Also, a revised decay scheme for copper-60 was deduced.

AD-641 536 **Field 20H**
Not available from CFSTI.
Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
COMPOUND INELASTIC NUCLEON AND GAMMA-RAY ANGULAR DISTRIBUTIONS FOR EVEN-AND ODD-MASS NUCLEI.
Scientific rept.,
by Eric Sheldon, and Douglas M. Van Patter.
1966, 46p
Grants AF-AFOSR-401-63, NSF-GP-3745
Proj. AF-9751
Task 975102
AFOSR-66-1772
Prepared in cooperation with Eidgenossische Technische Hochschule, Zurich (Switzerland) Laboratorium fuer Kernphysik.
Availability: Published in Reviews of Modern Physics v38 n1 p143-86 Jan 1966.

Descriptors: (*Nuclear particles, Inelastic scattering), (*Inelastic scattering, *Gamma emission), Nuclear energy levels, Nuclear structure, Differential cross section, Proton reactions, Neutron reactions, Nuclear spins, Programming (Computers), Reviews, Switzerland.

The current theoretical and experimental status of angular distributions of inelastically scattered nucleons and succeeding gamma radiations on the basis of a compound-nucleus mechanism is reviewed, with special reference to symmetry, isotropy, and identity characteristics. Results of investigations using a fast computer to ascertain the influence of higher partial waves, multipole mixing, unobserved intermediate transitions, and the presence of additional exit channels are presented, together with an over-all survey of distribution systematics and tabulations of numerical parameters to assist in evaluation of differential cross sections by hand. The predictions for both proton and neutron inelastic scattering are discussed in detail and illustrated by analyses of experimental data for many nuclear spin sequences. In particular, it is shown for gamma distributions that the effect of cascades from higher levels upon the distribution structure and magnitude can be very appreciable. Also, the examination of the predicted behavior of (n, n'gamma) distributions near threshold has disclosed features deserving of further experimental and theoretical study. A set of recently measured (n, n'gamma) distributions for several heavy nuclei involving transitions between nuclear states of relatively high integer or half-integer spin is shown to compare well with the theoretical predictions when suitable account is taken of cascade and exit-channel contributions. It is concluded that there is a wide range of application of this theoretical approach to energy-averaged distributions, much of which remains yet to be exploited. (Author)

AD-641 542 **Field 20H**
Not available from CFSTI.
Ohio Univ., Athens. Dept. of Physics.
NUCLEON SINGLE-PARTICLE LEVELS IN A DIFFUSE NONLOCAL POTENTIAL WELL.
Interim rept.,
by R. D. Koshel. 29 Nov 65, 6p
Grant AF-AFOSR-854-65
Proj. AF-9761
Task 976101
AFOSR-66-1316
Availability: Published in The Physical Review v144 n3 p811-4 Apr 22 1966.

Descriptors: (*Zirconium, *Nuclear energy levels), (*Nuclear particles, Nuclear energy levels), Neutron scattering, Nuclear models, Electrostatics, Nuclear shell models, Nuclear binding energy.

Calculations were made of the nucleon single-particle levels in Zr91 using a diffuse nuclear potential. The results of both local and nonlocal calculations are presented. The nonlocal calculations were made using the equivalent local-potential model formulated by Perey and Buck. It is shown that the nonlocal model provides good shell-model ordering of the states, gives parameters which are in good agreement with those found in scattering, yields results which are in good agreement with the experimentally determined levels, and gives a value of 3.07 MeV for the binding energy per nucleon. The value of the binding energy per nucleon found in the local calculations was 0.91 MeV. (Author)

AD-641 626 **Field 20H, 20J**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
POLARIZATION OF A DECAY PARTICLE IN A TWO-STEP PROCESS: APPLICATION TO NEGATIVE-KAON + PROTON TO NEUTRAL-PION + NEUTRAL-SIGMA HYPERON, NEUTRAL-SIGMA HYPERON TO GAMMA RAY + LAMBDA HYPERON.
Revised ed.,
by J. Sucher, and Moon H. Cha. 13 Jul 65, 11p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0801
Revision of manuscript submitted 6 Jul 64. Prepared in cooperation with Naval Ordnance Lab., Silver Spring, Md., and CERN, Geneva (Switzerland).
Availability: Published in The Physical Review v140 n3B pB668-75 Nov 8 1965.

Descriptors: (*Decay schemes, Nuclear spins), (*Nuclear spins, Polarization), (*V particles, Polarization), Nuclear reactions, Phase shift, K mesons, Proton bombardment, Pions, Sigma hyperons, Gamma rays.

The phenomenology of two-step processes of the Type A + B into C + D, D into E + F is studied for the particular case when among the final particles only F is observed. Formulas convenient for the computation of the polarization of F in terms of the parameters describing the production process are presented, and the connection between the polarization of F and that of D, when D is not observed, is clarified. Numerical results are obtained for the angular dependence of the lambda polarization in the process negative-kaon + proton to neutral-pion to neutral-sigma hyperon, neutral-sigma hyperon to gamma ray + lambda hyperon at a variety of incident energies.

AD-641 684 **Field 20H**
Not available from CFSTI.
Florida State Univ., Tallahassee. Dept. of Physics.
DIRECT REACTION ANALYSIS OF THE F19 (p,alpha)O16 REACTION,
by K. L. Warsh, and Steve Edwards. 14 Aug 64, 21p
Grants AF-AFOSR-440-63, NSF-GP-671
Proj. AF-9751
Task 975102
AFOSR-66-1279
Availability: Published in Nuclear Physics v65 p382-400 1965.

Descriptors: (*Fluorine, *Proton bombardment), (*Alpha decay, Distribution), Oxygen, Alpha spectra, Theory, Nuclear energy levels, Nuclear cross sections.

Thirty-two angular distributions of the F19 (p,alpha) O16 reaction over a 23 MeV range were analysed using a plane-wave direct reaction theory incorporating pick-up and exchange pick-up (or heavy-particle stripping) coherently mixed (PWBAE theory). The results of this analysis indicate that the reaction proceeds predominantly by a direct reaction mechanism, but that compound nucleus contributions cannot be ignored at certain energies. Only partial success in obtaining a fit to the extreme backward peak at 11000 MeV proton bombarding energy, plus the fact that the poorest fits are obtained for other angular distributions with large backward peaking, indicate that other mechanisms than first-order exchange effects are possibly contributing to the backward peaking observed. (Author)

AD-641 691 **Field 20H**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Physics.
DYNAMICS OF THE Y1* BRANCHING RATIO.
Revised ed.,
by Boris Kayser, and Elliott Bloom. 20 Dec 65, 7p
Grant AF-AFOSR-232-64
Proj. AF-9751
Task 975101
AFOSR-66-1286
Revision of manuscript submitted 29 Sep 65. Supported in part by AEC. Prepared in cooperation with California Inst. of Tech., Pasadena, Dept. of Physics.
Availability: Published in The Physics Review v144 n4 p1176-81 Apr 29 1965.

Descriptors: (*Hyperons, *Decay schemes), Pions, Sigma hyperons, V particles, Particle trajectories, Elastic scattering, Nuclear resonance.

Identifiers: Y particles.

The pi sigma/pi lambda branching ratio of the Y1* (1385) is significantly smaller than the phase space estimate. The fact that in the 3/2 (+), I=1 pi sigma state the force is repulsive, while in the corresponding pi lambda state it is attractive, is shown to be important in bringing this about. A general analysis of n-channel diagonalizable systems, and a number of specific diagonalizable and nondiagonalizable models, are presented to establish that this importance is not model-dependent. (Author)

AD-641 764 **Field 20H**
Not available from CFSTI.
Washington Univ., Seattle.
RELAXATION NARROWING OF MOSSBAUER GAMMA RAYS,
by J. G. Dash, and R. H. Nussbaum. 17 Feb 66, 7p
Grant AFOSR-594-64
Proj. AF-9763
Task 976303
AFOSR-66-1620
Availability: Published in Physical Review Letters v16 n13 p567-70 Mar 28 1966.

Descriptors: (*Gamma rays, *Mossbauer effect), (*Relaxation time, Gamma rays), Excitation.

Time-delayed coincidence measurements on Mossbauer gamma rays have demonstrated changes in resonance line shapes, including broadening and narrowing to less than natural linewidths. These changes, which were first analyzed in terms of classical radiation theory and later quantum mechanically, are due to the modulation of the normally exponential decay of the resonance emission by electronic gating of the detector circuits. We wish to point out in this Letter that there exists

a class of naturally occuring relaxation phenomena which may cause similar effects for Mossbauer gamma rays due to atomic and solid-state effects. (Author)

AD-641 767 **Field 20H**
Not available from CFSTI.
Catholic Univ. of America, Washington, D. C.
EXCHANGE MAGNETIC MOMENT IN THREE-BODY NUCLEI (II),
by James G. Brennan, William M. Frank, and Doran W. Padgett. 18 Jan 65, 6p
Grant AF-AFOSR-566-64
Proj. AF-9751
Task 975101
AFOSR-66-0804
See also AD-641 768.
Availability: Published in Nuclear Physics v73 p445-8 1965.

Descriptors: (*Nuclei, *Meson reactions), (*Nuclear magnetic moments, Mesons), Nuclear energy levels, Wave functions, Operators (Mathematics), Matrix algebra.

Identifiers: Meson exchange, Trions.

Meson exchange effects which arise in static Chew-Low theory include terms which can connect S state to D state components of the three-body wave function. Using a modified Pease-Feshbach three-body wave function, such meson exchange contributions were determined. The result, -0.03 nuclear magnetons, is of the right sign and magnitude to bring the total meson exchange moment into close agreement with that predicted by Sachs. (Author)

AD-641 768 **Field 20H**
Not available from CFSTI.
Catholic Univ. of America, Washington, D. C.
EXCHANGE MAGNETIC MOMENT IN THREE-BODY NUCLEI (I),
by Doran W. Padgett, William M. Frank, and James G. Brennan. 18 Jan 65, 24p
Grant AF-AFOSR-566-64
Proj. AF-9751
Task 975101
AFOSR-66-0805
See also AD-641 767.
Availability: Published in Nuclear Physics v73 p424-44 1965.

Descriptors: (*Nuclei, *Meson reactions), (*Nuclear magnetic moments, Mesons), Anomalies, Nuclear energy levels, Ground state, Matrix algebra, Wave functions, Pions.

Identifiers: Meson exchange, Trions.

Meson exchange effects are considered in an attempt to explain the nuclear magnetic moment anomaly of the three-body system. The exchange magnetic moments were calculated for the case of two-body one-meson exchange and three-body two-meson exchange in the ground state of the three-body system by the methods of static Chew-Low theory. The ground state was assumed to be pure space symmetric 2S1/2 state. An adjustable hard core radius rc was used in the form of a cut-off of the radial integrals for interparticle distance less than rc. The absolute value of the total exchange moment was found to be 0.4, 0.3 and 0.2 n.m. for hard core radii 0.3, 0.4 and 0.5 fm, respectively. The two-body one-meson exchange process for the hard core radius of 0.4 fm accounts for 0.2 n.m. which is 2/3 of the value reported by Villars. The remaining 0.1 n.m. results from the three-body two-meson exchange process. (Author)

AD-641 991 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Oslo Univ., (Norway). Inst. of Physics.
HIGH ENERGY PHYSICS WITH EMPHASIS ON STRANGE PARTICLES.
Final scientific rept.
30 Sep 66, 91p
Grant AF-EOAR-95-65
Proj. AF-9751
Task 975101
AFOSR-66-2606

Descriptors: (*Strange particles, Particle trajectories), (*V particles, Particle trajectories), (*K mesons, Meson capture), (*Meson capture, Hyperons), Halogenated hydrocarbons, Nuclei, Radioactive decay, Protons, Pions, Nuclear spectroscopy, Decay schemes, Photographic emulsions, Norway.

Identifiers: Hypernuclei.

A description is given of an investigation of the lambda hyperon production in negative-K captures at rest on complex nuclei in a heavy liquid bubble chamber filled with CF3Br. Main emphasis was put on a study of the lambda production in negative-K interactions which are not associated with the emission of charged or neutral pions, i.e. possible examples of negative-K captures on more than one nucleon. The total rate of lambda emission from negative-K captures in CF3 was estimated to (60 plus or minus 3)%. Lower and upper limits for the percentage of lambda hyperons produced in negative-K interactions on more than one nucleon were determined to (22 plus or minus 4)% and (40 plus or minus 3)% respectively. It was found that lambda hyperons are rarely produced directly in negative-K captures on pair of protons. The results of an investigation on hypernuclei produced by negative-K captures in nuclear emulsions are also reported. The reliability of a kinematic analysis method to identify the hypernuclei was examined by applying it to various categories of production and decay stars.

AD-641 998 **Field 20H**
Not available from CFSTI.
California Inst. of Tech., Pasadena.
DEUTERON ELASTIC SCATTERING FROM He3 AND H3,
by T. A. Tombrello, R. J. Spiger, and A. D. Bacher. Oct 65, 22p
Contract Nonr-220 (47)
Availability: Published in Nuclear Physics 1965.

Descriptors: (*Deuterons, *Elastic scattering), (*Helium, Deuteron reactions), (*Hydrogen, Deuteron reactions), Deuteron bombardment, Nuclear energy levels, Excitation, Nuclear resonance, Neutrons, Protons, Field theory, Selection rules.

The elastic scattering of deuterons from helium-3 and hydrogen-3 was studied for bombarding energies up to 11 MeV. The excitation curves obtained show a broad resonance in the scattering cross section corresponding to an excitation energy of 20 plus or minus 0.5 MeV in both helium-5 and lithium-5. These data together with H3 (d,n)He4 and He3 (d,p)He4 data from other sources tend to indicate that D-waves are responsible for the anomaly. (Author)

AD-642 000 **Field 20H**
Not available from CFSTI.
California Inst. of Tech., Pasadena.
MASSES AND EXCITATION ENERGIES OF SOME PROTON-RICH NUCLEI,
by Richard G. Miller, and R. W. Kavanagh. Oct 66, 55p
Contract Nonr-220 (47)
Availability: Published in Nuclear Physics 1966.

Descriptors: (*Alpha particle reactions, *Nuclear energy levels), Nuclei, Excitation, Alpha bombardment, Protons, Neutrons, Nuclear cross sections, Gamma rays, Nuclear reactions.

Q values for seven (3He,n) reactions were measured, using a silicon semiconductor detector as a fast-neutron spectrometer, with the following results (final nuclei, Q values in keV): 26Si, 85 plus or minus 18; 30S, - 573 plus or minus 15; 34Ar, - 759 plus or minus 15; 42Ti, - 2865 plus or minus 6; 48Cr, 5550 plus or minus 18; 56Ni, 4513 plus or minus 14; and 60Zn, 818 plus or minus 18. The following excited states (excitation energies in MeV) were also seen: 26Si, 1.79, 2.80; 30S, 2.19; 34Ar, 2.06; 48Cr, 0.72, 2.37 (values not certain); 56Ni, 2.69, 3.95, 6.60; and 60Zn, 1.02. Rough measurements of the 0 degree (3He,n) cross sections are given. Neutron angular distributions for 28Si (3He,n) to the ground and first excited states of 30S are consistent with assignments of 0 (+) and 2 (+). Two gamma rays observed, with energies 1.28 plus or minus 0.06 and 2.66 plus or minus 0.1 MeV, are attributed to 54Fe (3He, n + gamma)56Ni. The (3He,p) Q values of nuclear reactions forming 48V, 56Co, and 60Cu were measured with a magnetic spectrometer. Ground-state Q values for 56Co and 60Cu are 7410 plus or minus 10 keV and 5770 plus or minus 12 keV. (Author)

N66-32726 **Field 20H**
CFSTI Prices HC$5.65 MF$2.50
College Of William And Mary, Williamsburg, Va. Dept. Of Physics.
INTERMEDIATE ENERGY PHYSICS, VOLUME I.
Feb 66, 515p NASA-CR-76991
Grant NSG-567
Proc. Of A Conf. Held At Williamsburg, Va., 10-12 Feb. 1966

Descriptors: *Charge distribution, *Conference, *Meson-nucleon interaction, *Muon, *Nuclear structure, *Nucleon-nucleon scattering, *Phase shift, *Pion, *Proton, *Spectroscopy, *Theoretical physics, Analysis, Atom, Charge, Decay, Distribution, Electron, Gamma, Interaction, Mode, Nuclear, Nucleon, Phase, Physics, Ray, Scattering, Shift, Structure.

For abstract, see STAR 04 19.

N66-32766 **Field 20H**
CFSTI Prices HC$4.25 MF$2.00
College Of William And Mary, Williamsburg, Va. Dept. Of Physics.
INTERMEDIATE ENERGY PHYSICS, VOLUME II.
Feb 66, 375p NASA-CR-76992
Grant NSG-567
Proc. Of A Conf. Held At Williamsburg, Va., 10-12 Feb. 1966

Descriptors: *Bremsstrahlung, *Conference, *Elementary particle, *Meson-nucleon interaction, *Nucleon-nucleon scattering, *Phase shift, *Proton, *Resonance, Analysis, Effect, Elementary, Energy, Interaction, Mechanics, Meson, Neutron, Nuclear, Nucleon, Particle, Phase, Physics, Pion, Polarization, Quantum, Scattering, Shift, Spectroscopy, Structure.

For abstract, see STAR 04 19.

N66-32964 **Field 20H**
CFSTI Prices HC$1.00 MF$0.50
Washington Univ., St. Louis, Mo. Cosmic Ray Group.
AN APPARENTLY HIGH FLUX OF PRIMARY COSMIC-RAY GAMMA-PARTICLES AT 41 DEG N. MAG.,
by M. W. Friedlander, and J. Klarmann. Jun 66, 23p NASA-CR-77000, CR-66-2
Grant NSG-185-61
Submitted For Publication

Descriptors: *Alpha particle, *Balloon flight, *Nuclear emulsion, *Particle flux, *Primary cosmic radiation, Activity, Alpha, Balloon, Cosmic, Emulsion, Flight, Flux, High altitude, Measurement, Nuclear, Particle, Photographic, Radiation, Ray, Solar.

For abstract, see STAR 04 19.

N66-33175 Field 20H
CFSTI Prices HC$1.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
CLASSICAL AND QUANTAL SCATTERING. I - THE CLASSICAL ACTION.
by F. T. Smith. 21 Sep 64, 19p NASA-CR-59567
Contract NASR-49/07/
Submitted For Publication

Descriptors: *Atomic collision, *Quantum mechanics, *Scattering, Action, Amplitude, Atom, Classical, Collision, Mechanics, Phase, Quantum, Shift.

For abstract, see STAR 04 19.

N66-33183 Field 20H
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THEORY OF PROTON-HYDROGEN COLLISIONS.
by I. M. Cheshire. 1964, 42p NASA-TM-X-54929
Submitted For Publication

Descriptors: *Atomic collision, *Charge exchange, *Excitation, *Hydrogen, *Proton, Atom, Charge, Collision, Cross section, Exchange, Impact, Method, Parameter, Particle, Theory.

For abstract, see STAR 04 19.

N66-33384 Field 20H
CFSTI Prices HC$2.00 MF$0.50
Maryland Univ., College Park. Inst. For Molecular Physics.
HIGHER-ORDER STATIONARY PHASE APPROXIMATIONS IN SEMICLASSICAL SCATTERING.
by E. A. Mason, F. J. Smith, and J. T. Vanderslice. 30 Nov 64, 29p NASA-CR-59822, IMP-NASA-43
Grant NSG-5-59
Submitted For Publication

Descriptors: *Approximation method, *Differential analyzer, *Quantum mechanics, *Scattering cross section, *Theoretical physics, Analysis, Approximation, Cross, Difference, Elasticity, Expansion, Mechanics, Method, Particle, Phase, Physics, Quantum, Scattering, Section, Stationary, Theory.

For abstract, see STAR 04 19.

N66-33389 Field 20H
CFSTI Prices HC$2.00 MF$0.50
Trw Systems, Redondo Beach, Calif. Space Systems Lab.
WAVE-PARTICLE INTERACTIONS IN THE SOLAR WIND.
by F. L. Scarf. 10 May 66, 47p NASA-CR-77043, TRW-4541-6003-RO-000
Contract NASW-1366
Presented At D.g.r.r. Symp. On Exploration Of The Moon And Interplanetary Space, Munich, 22 Apr. 1966 Submitted For Publication

Descriptors: *Particle collision, *Solar wind, *Wave interaction, Acceleration, Collision, Conduction, Dynamics, Field, Fluid, Interaction, Magnetic, Particle, Plasma, Process, Scattering, Solar, Thermal, Viscosity, Wave, Wind.

For abstract, see STAR 04 19.

N66-33413 Field 20H
CFSTI Prices HC$1.00 MF$0.50
California Inst. Of Tech., Pasadena.
ACCELERATION OF ELECTRONS NEAR THE EARTH'S BOW SHOCK.
by L. Davis Jr, and J. R. Jokipii. Oct 64, 9p NASA-CR-59559
Grant NSG-426
Submitted For Publication

Descriptors: *Bow shock, *Electron plasma, *Magnetosphere, *Plasma acceleration, Acceleration, Bow, Earth, Electron, Field, Magnetic, Mechanism, Plasma, Region, Shock, Wave.

For abstract, see STAR 04 19.

N66-33415 Field 20H
CFSTI Prices HC$1.00 MF$0.50
Maryland Univ., College Park. Inst. For Molecular Physics.
COLLISION INTEGRALS FOR THE EXPONENTIAL ATTRACTIVE POTENTIAL.
by E. A. Mason, R. J. Munn, and F. J. Smith. 30 Nov 64, 14p NASA-CR-59939, IMP-NASA-44
Grant NSG-5-59
Submitted For Publication

Descriptors: *Gas transport, *Molecular collision, *Numerical integration, *Potential field, Attraction, Calculation, Collision, Exponent, Field, Gas, High temperature, Integration, Inverse, Molecular, Numerical, Potential, Power, Property, Transport.

For abstract, see STAR 04 19.

N66-33691 Field 20H
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
SEARCH FOR HIGH-ENERGY PHOTONS FROM DISCRETE SOURCES OF COSMIC RADIATION.
O Poiske Fotonov Vysokoy Energii Ot Diskret-Nykh Istochnikov Kosmicheskogo Radioizluchen- Iya
by A. YE.Chudakov, V. L. Dadykin, N. M. Nesterova, and V. I. Zatsepin. Jun 66, 11p NASA-TT-F-10190
Transl. Into English Of A Paper Presented At The 1st All-union Conf. On The Invest. Of Cosmic Rays From A Space Phys. Standpoint, Yakutsk, Ussr, 23 Aug. - 2 Sep. 1962

Descriptors: *High energy interaction, *Photon, *Radio source, Cerenkov radiation, Collision, Electron, Flux, High energy, Interaction, Matter, Nuclear, Nucleus, Radiation, Radio, Source, Space.

For abstract, see STAR 04 19.

N66-38409 Field 20H
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Manned Spacecraft Center, Houston, Tex.
CALCULATIONS OF ENERGY AND ANGULAR DISTRIBUTIONS OF ELECTRONS EJECTED FROM HELIUM BY 200- KE V AND 300- KE V PROTONS.
by W. J. Oldham Jr. Oct 66, 22p NASA-TN-D-3641
Contract 030-00-00-CF-72

Descriptors: *Angular distribution, *Electron energy, *Helium, Approximation, Bombardment, Calculation, Cross section, Differential, Ejection, Four, Function, Ground, Ionization, Proton, Secondary, State, Term, Wave.

For abstract, see STAR 04 23.

N66-38730 Field 20H
CFSTI Prices HC$1.00 MF$0.50
California Univ., San Diego.
THEORETICAL IDEAS CONCERNING X-RAY SOURCES.
by G. Burbidge. 1966, 13p NASA-CR-78537
Grant NSG-357
Presented At The Iau Symp. No. 31 On Radio Astronomy And The Galactic System, Noordwijk, Netherlands, 1 Sep. 1966 Submitted For Publication

Descriptors: *Black body radiation, *Bremsstrahlung, *Proton, *Synchrotron radiation, Compton effect, Crab nebula, Galaxy, Gas, Inverse, Nova, Optical, Radio, Source, Supernova, Thin, X-ray.

For abstract, see STAR 04 23.

N66-38758 Field 20H
CFSTI Prices HC$2.00 MF$0.50
Republic Aviation Corp., Farmingdale, N. Y.
SOLAR FLARE HAZARD TO EARTH-ORBITING VEHICLES FINAL REPORT.
11 Apr 66, 50p NASA-CR-66202, FHR-1395-3
Contract NAS1-3601

Descriptors: *Geomagnetic storm, *Radiation hazard, *Solar flare, Dipole, Dose, Earth, Earth satellite, Effect, Field, Magnetic, Model, Orbital, Shadow, Spacecraft, Stormer theory.

For abstract, see STAR 04 23.

PB-173 390 Field 20H
CFSTI Prices: HC$2.00 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
INTERACTIONS A DEUX CORPS DANS LA REACTION 9Be (n,nn) ALPHA ALPHA A 14 MeV - I. MISE EN EVIDENCE DES ETATS RESONNANTS (Two-Body Interaction in the Reaction 9Be (n,nn) Alpha Alpha at 14 MeV. I. Existence of Resonating States).
Doctoral thesis in French,
by Claude Perrin. Sep 66, 46p CEA-R-2985
Text in French; attached summary in English.

Descriptors: (*Beryllium, Neutron reactions), (*Neutron reactions, Pair production), Alpha particles, Vector analysis, Nuclear resonance, Inelastic scattering, Decay schemes, Nuclear energy levels, France.

A study was made of the basic mechanisms of the reaction 9Be (n,nn) Alpha Alpha and their application to an experiment in which the two impulsion vectors of the neutrons are measured. Kinematic and phase space calculations were performed. An analysis of groups of events (n,2n) observed in the (T1,T2) plot shows a sequence of two body interactions: inelastic scattering 9Be (n,n') followed by emission of neutrons 9Be* to 8Be*+n of the decay of the (6.76 - 7.94 - 9.1 MeV) levels of 9Be to 8Be in the (0+) and (2+) states. (Author)

PB-173 393 Field 20H
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDE DU SYSTEME ANTI-K, PION DANS LES ETATS FINALS A 3 CORPS, PRODUITS PAR LES INTERACTIONS K-P A 3 GeV/c (Study of the Anti-K, Pion System in the 3 Bodies Final States, Produced by 3 GeV/c K-p Interactions).
Doctoral thesis,
by Alain Verglas. Jun 66, 77p CEA-R-3032
Text in French; attached summary in English.

Descriptors: (*Meson reactions, Decay schemes), (*K Mesons, Meson reactions), (*Antiparticles, K mesons), Pions, Protons, Nuclear resonance, Nuclear spins, France.

The K-p to K* (891) pion reactions is a good example of a 'quasi two-body' phenomenon, exhibiting the characteristics of 'periperism'. The predictions of the 'one meson exchange', and 'absorption' models are compared with the experimental results. Conclusions are drawn concerning the production mechanism of the Kp to K* pion reaction, as well as on the validity of the models. Finally, the K* (1400) resonance is studied and its isospin determined. (Author)

PB-173 401 Field 20H, 18H
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CORRELATIONS DIRECTIONNELLES ELECTRON-GAMMA (Electron-Gamma Directional Correlations),
by Tor Ragnar Gerholm. Oct 66, 66p CEA-R-3025
Text in French; attached summary in English.

Descriptors: (*Nuclear spectroscopy, Correlation techniques), (*Electrons, *Internal conversion), (*Gamma emission, Correlation techniques), Nuclear energy levels, Radioactive decay, Nuclear spins, Hyperfine structure, Attenuation, Gamma-ray spectrum, Matrix algebra, Nuclear structure, France.

The interest of the conversion electron-gamma angular correlations in nuclear spectrometry is shown and the presence of 'penetration matrix elements' and the importance of the 'dynamic' corrections due to the finite dimension of the nucleus is emphasized. A comparative study between the conversion electron-gamma and the gamma-gamma angular correlations was carried out and it is shown that a simultaneous measure of these two correlation functions permits the removal of the attenuation factors due to the action of extranuclear fields. A complete study of such fields was carried out, making obvious the 'hole' effects corresponding to a hyperfine structure interaction between the nuclear spin and the atom spin. Experiments permitting the determination of the b2 (E2) and the Alpha-K (E2) coefficients are described. The determination of the penetration matrix elements in the M1 conversion process are applied to the study of nuclear structure problems. Experiments showing clearly the E0 transition mode in direct competition with the M1 and E2 internal conversion are described.

AD-641 451 See Field 20J
AD-641 458 See Field 4A
AD-641 459 See Field 4A
AD-641 509 See Field 3B
AD-641 538 See Field 20L
AD-641 552 See Field 20J
AD-641 553 See Field 20J
AD-641 616 See Field 20J
AD-641 617 See Field 20J
AD-641 618 See Field 20J
AD-641 619 See Field 20J
AD-641 622 See Field 20J
AD-641 625 See Field 20J
AD-641 638 See Field 20C
AD-641 687 See Field 3B
AD-641 746 See Field 18H
AD-641 765 See Field 18H
AD-641 782 See Field 20C
AD-641 847 See Field 7D
AD-641 908 See Field 20J
N66-37785 See Field 20B
PB-173 397 See Field 14B
PB-173 400 See Field 20L
PB-173 444 See Field 3B
PB-173 461 See Field 5B

20I. PLASMA PHYSICS

AD-134 400 Field 20I, 1A
CFSTI Price: HC$4.60
Graduate Aeronautical Labs., Calif. Inst. of Tech., Pasadena.
AN AERODYNAMIC STUDY OF THE 'ELECTRIC WIND',
by Donald James Harney. Sep 57, 45p

Descriptors: (*Electrical corona, *Gas ionization), (*Turbulence, Air), Electrical properties.

The basic physical process considered is the appearance of a pressure gradient in a slightly ionized gas under the influence of an electric field. On a molecular scale this process involves the acceleration of ions in an electric field and the transfer of momentum to the main body of the fluid through collisions. A particular phenomenon involving this basic process is the pressure gradient in a point corona discharge and the resulting 'electric wind'. The experimental arrangement studied is a point to a downstream coaxial cylinder discharge in air.

AD-248 052 Field 20I
CFSTI Price: HC$1.60
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
THE THEORY OF PLASMA RADIATION,
by A. Isihara. 12 Oct 60, 19p
Contract AF 30 (602)-2045
RADC-TN-60-255

Descriptors: (*Plasma medium, Electromagnetic waves), Distribution functions, Statistical analysis.

The electromagnetic field of a fully ionized plasma is considered. It is shown that there exist two different types of radiation, one being characteristic of equilibrium plasmas and the other being intrinsic to non-equilibrium plasmas. The latter radiation is determined by the time rate of change of the distribution function and is investigated in detail for the case where the change in the distribution function is caused by the collisions between plasma particles. Due to the statistical method adopted, it is possible to take not only two-body but many-body collisions into consideration. As a result, the radiation field is related to a statistical quantity such as the pressure. The spectral analysis of the radiation is given, and the coupling between forces in the plasmas and radiation is discussed. (Author)

AD-294 466 Field 20I
CFSTI Price: HC$4.60
GM Defense Research Labs., Santa Barbara, Calif. Aerospace Operations Dept.
A NUMERICAL METHOD FOR THE DETERMINATION OF THE TRANSMISSION AND REFLECTION COEFFICIENTS OF A NON-UNIFORM PLASMA SLAB,
by Srbislav Zivanovic. Dec 62, 42p Technical rept. TR62-209J
Contracts DA-04-495-ORD-3567 (Z), ARPA order-347-62
Proj. 7400
Hypervelocity Range Research Program, part of Project Defender.

Descriptors: (*Plasma medium, Wave transmission), Differential equations, Electromagnetic waves, Matrix calculus, Radio waves, Mathematical analysis, Electromagnetic fields, Reflection, Applied mathematics.

Plasma matrix coefficients A, B, C and D are defined in a manner similar to that in the theory of four terminal networks. A numerical method for calculating these plasma matrix coefficients directly from the wave equation is presented. Various transmission and reflection coefficients are expressed as combinations of the plasma matrix coefficients which are suitable for numerical calculations. It is shown that this method can be used in the case of composite slabs or slabs terminated with a conductive boundary. It can also be extended to include the reflections from semi-infinite non-uniform plasma. (Author)

AD-456 624 Field 20I, 20D, 7D
CFSTI Price: HC$1.00
Aerospace Corp., Los Angeles, Calif.
MISSION ORIENTED INVESTIGATION AND EXPERIMENTATION - GASEOUS DISCHARGE.
Semiannual technical rept., 1 Jul-30 Sep 64,
by Norman Cohen, Julian P. Heicklen, and Bernard H. Carson. 30 Jan 65, 18p Rept. no. TDR-469 (9240-01)-1
Contract AF 04 (695)-469
SSD-TDR 64-36

Descriptors: (*Gas discharges, Recombination reactions), (*Recombination reactions, Surfaces), (*Reaction kinetics, Recombination reactions), Free radicals, Oxygen, Halogenated hydrocarbons, Fluorides, Alkenes, Platinum, Heat transfer, Catalysis, Catalysts, Diffusion, Luminescence, Boundary layer, Dissociation, Hypersonic flow, Ablation, Reentry vehicles, Thermistors.

A new technique for measuring the catalytic efficiency of surfaces for atom recombination was developed. It is based on measuring the heat of atom recombination on the surface of small spherical thermistors. Extensive measurements of catalytic heat transfer to these spheres were made, existing analyses were verified by these data, and important considerations in the design of any experiment to study rarefaction effects were uncovered. An independent measurement of the 0-02 diffusion coefficient was obtained. The technique is well suited for studying the effects of surface temperature on the catalytic efficiency of materials. Results for the PT-O atom system are reported. In a flow system, CF4 was passed through an electrodeless discharge to produce CF2 radicals. Ethylene, which was injected downstream of the discharge, reacted completely with the CF2 radicals present to produce C3 compounds in a chemiluminescent reaction. Thus, the CF2 concentration could be monitored both optically and chemically as the mixture flowed down the glow tube. The value of the combination rate constant was estimated to be 10 to the 8th power liter/mole-sec. (Author)

AD-461 769 Field 20I, 7D
CFSTI Price: HC$9.60
Unified Science Associates, Inc., Pasadena, Calif.
THE TWO TRANSFORMER METHOD FOR ELECTRODELESS CONDUCTIVITY MEASUREMENTS.
Semiannual technical summary rept.,
by R. A. Williams, E. M. Gold, and S. Naiditch.
19 Feb 65, 96p
Contract Nonr-3437 (00)
Rept. on Stable Dense Cold Plasma.

Descriptors: (*Ammonia, Sodium compounds), (*Solutions, Life expectancy), (*Plasma medium, Stability), Water, Contamination, Electrical properties, Cleaning compounds, Solubility, Viscosity, Electron density, Effectiveness, Tungsten, Decomposition, Chemical analysis, Conductivity, Hall effect, Mercury, Instrumentation, Magnetic properties, Physical properties, Measurement.

An analysis of the two transformer system is presented. It is found that there is a frequency region in which the voltage transfer is proportional to the sample conductance. A comparison is made between the measured and predicted behavior of a

two transformer system. The good agreement obtained indicates that the method of analysis can be used as an aid to designing two transformer conductivity measuring systems. (Author)

AD-641 360 Field 20I, 9C
CFSTI Prices: HC$2.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
REMOVAL OF HYDROGEN IMPURITIES IN CLOSED NOBLE GAS DISCHARGE SYSTEMS.
Technical rept.,
by Rudolf G. Buser, and John J. Sullivan. Aug 66, 32p ECOM-2764
Proj. DA-1P0-14501-B11A
Task 1P0-14501-B11A-01-34

Descriptors: (*Plasma Medium, Purification), (*Discharge tubes, Impurities), Gas discharges, Helium, Hydrogen, Membranes, Palladium, Diffusion pumps, Metal films, Titanium, Kinetic theory, Deposition, Mass spectrum, Wave transmission, Evaporation, Vacuum pumps.

Identifiers: Ion getters.

The removal of hydrogen, considered as an impurity gas, from a closed noble gas (helium) discharge system is studied using the techniques of (1) hydrogen pumping through a heated palladium membrane and (2) hydrogen gettering by a titanium film deposited on a water-cooled stainless-steel surface. Mass spectrometric and optical measurements are presented which show the effect of helium background on hydrogen removal rate. Experimental results of hydrogen gettering on titanium agree with theoretical calculations based on kinetic theory, and not only support, but extend earlier work of other investigators. Removal of hydrogen by the palladium membrane is about equally effective for the geometry employed. In addition, laser transmission measurements of deposition of titanium films on a glass surface are studied. Dependence of deposition rate and film thickness on helium background pressure, and source temperature are shown. (Author)

AD-641 429 Field 20I
CFSTI Prices: HC$4.00 MF$0.75
Institute for Defense Analysis, Arlington, Va. Research and Engineering Support Div.
CONVERGENT TRANSPORT COEFFICIENTS OF PLASMA.
Research paper,
by Adolf R. Hochstim. Jun 66, 117p RP-P-264, IDA/HQ-66-4959
Contract SD-50
Presented in part at the International Conference on Phenomena in Ionized Gases (7th), Belgrade (Yugoslavia), 22-27 Aug 65.

Descriptors: (*Plasma physics, *Transport properties), Kinetic theory, Series, Polynomials, Ionization, Electrical conductance, Determinants.

Applying a series expansion of Laguerre polynomials in the solution of the plasma kinetic equation, in which Coulomb collisons are described by Fokker-Planck collision term and electron-neutral collisions by the Boltzmann collision term, elements of a 20 x 20 determinant (compared to 3 x 3 obtained by Landhoff and 4 x4 by Shkarofsky) were obtained for equilibrium plasma for the electron-electron and electron-ion contributions. At present convergence studies on dc and ac electric conductivity indicate slow convergence with increasing size of the determinant and, as a surprising feature, an oscillating solution as a function of the size of the determinant.

AD-641 548 Field 20I
Not available from CFSTI.
Yale Univ., New Haven, Conn.
STATISTICAL THEORY OF RADIATIVE PROCESSES IN PLASMAS,
by Philip J. Mallozzi, and Henry Margenau. 27 Jul 65, 65p
Contract Nonr-609 (51), Grant AF-AFOSR-843-65
Availability: Published in Annals of Physics v38 p177-237 1966.

Descriptors: (*Statistical mechanics, *Plasma physics), Quantum mechanics, Perturbation theory, Hamiltonian, Field theory.

The methods of quantum field theory have been shown to be adaptable to the study of equilibrium and nonequilibrium statistical mechanics. Especially noteworthy in this context is the work of Prigogine and his group, whose advances have led to a unification in statistical physics that is interesting and useful both in nonequilibrium and equilibrium situations, and can be developed in the framework of either classical or quantum mechanics. The present article is an extension of the plasma physics work of Prigogine and Balescu, which allows inclusion of radiation as well as particles. The present treatment will not meet the currently fashionable interest in fully ionized plasmas inasmuch as this initial account ignores the Coulomb interaction between electrons, focusing attention chiefly upon the behavior of photons and sparse electrons in the presence of ions and neutral molecules. It does allow for a transverse index of refraction, however, which results from an indirect interaction between electrons via the radiation field. The results of this paper are applicable to slightly ionized plasmas. However, the work permits certain conclusions which transcend this restriction.

AD-641 639 Field 20I
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
ENERGY TRANSFER FROM A TEST ELECTRON TO A COLLISIONLESS PLASMA.
Physical sciences research papers,
by Joseph G. Kelley, and Morton A. Levine. Sep 66, 32p AFCRL-PSRP-263, AFCRL-66-630
Proj. AF-8608
Task 860801

Descriptors: (*Plasma medium, Transport properties), Energy, Electrons, Perturbation theory, Conical bodies.

The perturbation of a collisionless plasma by a nonrelativistic test electron is derived in closed form. The electron loses energy driving currents in the plasma. No energy is lost to electromagnetic or electro-acoustic waves. However, electro-acoustic waves do occur in the Mach cone behind the test electron and provide a mechanism to couple test electrons over large distances. (Author)

AD-641 661 Field 20I
CFSTI Prices: HC$3.00 MF$0.50
Sylvania Electronic Systems-East, Waltham, Mass. Applied Research Lab.
RADIATION CONDITION FOR A MAGNETOPLASMA MEDIUM-I.
Research rept.,
by S. R. Seshadri, and T. T. Wu. Nov 66, 51p RR-502
Contract Nonr-3185 (00)
Proj. 110
Prepared in cooperation with Harvard Univ., Cambridge, Div. of Engineering and Applied Physics.

Descriptors: (*Magnetohydrodynamics, Electromagnetic waves), Plasma medium, Brillouin zones, Scattering, Fourier analysis.

The paper is concerned with the radiation condition for an unbounded magnetoplasma which is both anisotropic and dispersive. The usual form of the celebrated Sommerfeld radiation condition pertains to an isotropic and nondispersive medium and is not applicable to a magnetoplasma. A technique based on the principle of causality for the resolution of the consequent ambiguity is discussed. The branch-points and the associated branch-cuts of the integrands in the Fourier integral representations of the two modes which compose the actual field component in a steady state problem are examined with particular emphasis on certain of the branch-points which have been overlooked in the existing literature. (Author)

AD-641 726 Field 20I
Not available from CFSTI.
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
INTERACTION OF MICROWAVES WITH AN INHOMOGENEOUS AND ANISOTROPIC PLASMA COLUMN,
by C. Yeh, and W. V. T. Rusch. 23 Jun 64, 7p
Grant AF-AFOSR-496-64
Proj. AF-4751
AFOSR-66-0539
Availability: Published in Journal of Applied Physics v36 n7 p2302-6 Jul 1965.

Descriptors: (*Plasma medium, *Microwaves), Magnetic fields, Backscattering, Frequency, Density, Distribution.

The problem of the interaction of microwaves with a radially inhomogeneous plasma column confined by an impressed axial static magnetic field is treated analytically. Extensive numerical results for the back-scattering cross sections are presented for various interesting ranges of the parameters involved. It is found that the often-used homogeneous model for interpretation of experimental data can sometimes lead to ambiguous results. This ambiguity arises because of the interdependence of the average plasma frequency, the gyrofrequency, and the inhomogeneity of the plasma density distribution. Further measurements are suggested to distinguish these effects. (Author)

AD-641 854 Field 20I
CFSTI Prices: HC$2.00 MF$0.50
Lockheed Missiles and Space Co., Palo Alto, Calif.
PRODUCTION AND STUDY OF A CESIUM PLASMA IN THERMODYNAMIC EQUILIBRIUM.
Final rept., 17 May 63-16 May 66.
1966, 29p LMSC/2-78-66-1
Contract DA-31-124-ARO (D)-105
Projs. AROD-4336, DA-20014501B11B
AROD-4336:1

Descriptors: (*Plasma medium, *Cesium), Production, Thermodynamics, Ionization, Work functions.

The document describes means for producing a plasma in thermodynamic equilibrium without externally applied potentials. A cesium plasma is produced in an almost completely closed container, the container being maintained at a high temperature. Due to the low ionization potential of cesium (3.87 ev), one can obtain plasmas of interesting densities and properties at temperatures from 1500 to 2500K. Such plasmas have properties dependent only on temperature, the energy levels of cesium (strictly speaking of both neutral and ionized states), the work function of the container, and on the total amount of cesium present. (Author)

AD-641 899 Field 20I
CFSTI Prices: HC$9.60 MF$0.75
Geophysics Corp. of America, Bedford, Mass.
THE DYNAMIC SHIELDING RESPONSE OF AN IRRADIATED PLASMA,
by J. I. F. King. Feb 62, 96p Scientific-1, GCA-TR-62-9-A
Contract AF 30 (602)-2380
Proj. AF-5561
Task 55209
RADC-TDR-62-48A

Descriptors: (*Plasma medium, *Shielding), (*Electromagnetic waves, Attenuation), Frequency, Electron density, Ionization, Energy, Mathematical models.

An electromagnetic beam is in general attenuated in traversing a slightly-ionized plasma if the plasma frequency, a function of the electron density, is comparable to the frequency of the impressed radiation. A portion of the energy extracted from the beam may cause a local increase in the electron density either through thermal or direct collisional ionization. The altered electron density will in turn affect the beam heating pattern since the absorption coefficient is closely linked to the electron density. This coupling provokes the growth of an electron shield which propagates rapidly towards the radiation source. The shielding response deposits energy progressively upstream and inhibits deep plasma penetration of the beam. A nonlinear one-dimensional model of the Dynamic Shield Response (DSR) is solved analytically assuming the local heating given by the WKB solution of the wave equation. The size, shape and motion of the electron profile is specified as a function of space and time for a variety of plasma models. (Author)

AD-641 914 **Field 20I**
Not available from CFSTI.
TRW Systems, Redondo Beach, Calif.
PLASMA ROTATION IN A PULSED INDUCTIVE ACCELERATOR.
Interim rept.,
by C. L. Dailey. 1966, 8p
Contract AF 49 (638)-1210
Proj. AF-9752
Task 975201
AFOSR-66-2486
Presented at International Astronautical Congress (17th), Madrid, Spain, Oct 9-15, 1966.
Availability: Published in Proceedings of the International Astronautical Congress (17th).

Descriptors: (*Plasma medium, Rotation), Plasma accelerators, Electric currents, Thickness, Ionic current, Polarization.

When an initially field-free plasma is accelerated by a moving magnetic field the accelerating force is confined to a relatively thin layer of plasma current. An idealized theoretical treatment that neglects collisions and instabilities, depicts a layer of electron current in which ions are accelerated by a polarization electric field so as to preserve neutrality of the plasma. The predicted thickness of this layer is the gyro radius of a particle whose mass is the geometric mean of that of an ion and an electron. Experimentally, both electrode accelerators and the theta-pinch show a current layer thickness about 1.5 times the ion gyro radius, or about two orders of magnitude greater than the theoretical thickness. Investigation in the present inductive accelerator shows that plasma acceleration is due partly to ion current produced by the induced azimuthal electric field in a layer whose thickness is about half of the ion gyro radius. This behavior implies plasma rotation. A survey with miniature probes shows that any torque that could be produced by jxB body forces is at least an order of magnitude less than due to the electric field. (Author)

N66-32764 **Field 20I**
CFSTI Prices HC$1.00 MF$0.50
Rca Victor Co., Ltd., Montreal (Quebec). Research Labs.
APPENDIX - SOME SPECTROSCOPIC OBSERVATIONS OF THE INTERACTION BETWEEN A PLASMA WIND AND A DIPOLE MAGNETIC FIELD.
by R. A. Crane, and J. A. Nilson. Feb 66, 20p
NASA-CR-76879
Contract NASW-1088

Descriptors: *Magnetic spectroscopy, *Plasma-electromagnetic interaction, Barium, Chlorine, Dipole, Electromagnetism, Field, Interaction, Ion, Luminosity, Magnetic, Nitrogen, Oxygen, Photography, Plasma, Pressure, Seeding, Spectroscopy, Spectrum, Study.

For abstract, see STAR 04 19.

N66-33440 **Field 20I**
CFSTI Prices HC$2.00 MF$0.50
Geophysics Corp. Of America, Bedford, Mass. Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
SPUTTERING ION SOURCE STUDY PROGRAM, SECOND PHASE FINAL REPORT, 2 JAN. - 15 NOV. 1962.
15 Dec 62, 31p NASA-CR-77051
Contracts NAS7-100, JPL-950118
Prepared For Jpl

Descriptors: *Ion source, *Mass spectrometry, *Sputtering, Analysis, Beam, Duoplasmatron, Gas, Ion, Ionization, Mass, Plasma, Rare, Secondary, Solid, Source, Spectrometry, Spectrum.

For abstract, see STAR 04 19.

N66-33700 **Field 20I**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
THEORY OF PULSE DISCHARGES IN A LIQUID MEDIUM.
K Teorii Impul'snykh Razryadov V Zhidkoy Srede
by V. V. Arsentyev. May 66, 18p NASA-TT-F-10147
Transl. Into English From Zh. Prik. Mekhan. I Techn. Fiz. (Moscow), No. 5, 1965 P 51-57

Descriptors: *Shock wave, *Spark discharge, *Underwater explosion, Channel, Discharge, Energy, Expansion, Explosion, Liquid, Motion, Particle, Plasma, Pulse, Shock, Spark, Underwater, Wave.

For abstract, see STAR 04 19.

N66-34043 **Field 20I**
CFSTI Prices HC$3.00 MF$0.75
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
THE SUBSTITUTION OF A SEMI-INFINITE, HOMOGENEOUS DIELECTRIC MEDIUM FOR A PLASMA SLAB.
by S. Gotkis. 30 Apr 66, 66p NASA-CR-77137
Grant NSG-448
Its Rept.-1691-19

Descriptors: *Antenna, *Dielectrics, *Impedance, *Plasma slab, Aperture, Coefficient, Finite, Homogeneity, Inhomogeneity, Medium, Plane, Plasma, Radiation, Reflection, Semiinfinite, Slab, Substitution, Wave.

For abstract, see STAR 04 19.

N66-34074 **Field 20I**
CFSTI Prices HC$1.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Plasma Research Lab.
RADIATION TEMPERATURE MEASUREMENTS OF THE NITROGEN AFTERGLOW PLASMA.
by E. H. Holt, and J. H. Noon. Jun 66, 10p
NASA-CR-77079
Grant NSG-48
Its Tech. Rept.-66-4 Submitted For Publication

Descriptors: *Afterglow, *Nitrogen ion, *Plasma physics, *Radiation measurement, *Temperature measurement, Collision, Discharge, Electron, Frequency, Ion, Measurement, Microwave, Nitrogen, Physics, Plasma, Radiation, Temperature, Tube.

For abstract, see STAR 04 19.

N66-34076 **Field 20I**
CFSTI Prices HC$2.00 MF$0.50
State Univ. Of Iowa, Iowa City. Dept. Of Physics And Astronomy.
SCATTERING OF ENERGETIC PARTICLES BY LABORATORY PLASMAS.
by I. Alexeff, D. Montgomery, and C. Roque. Jun 66, 27p NASA-CR-77120
Grant NSG-233-62
Sponsored In Part By Aec Its Rept.-66-25

Descriptors: *Autocorrelation, *Correlation function, *Electric field, *Particle beam, *Scattering coefficient, Beam, Coefficient, Correlation, Electric, Energetic, Field, Particle, Plasma, Scattering.

For abstract, see STAR 04 19.

N66-37684 **Field 20I**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
SMALL PLASMA PROBES WITH GUARD RINGS AND THERMOCOUPLES.
by J. F. Morris. Oct 66, 23p NASA-TM-X-1294
Contract 123-33-02-09-22

Descriptors: *Plasma probe, *Thermocouple, Cement, Ceramic, Gas, Guard, Ionized, Langmuir probe, Nickel, Ring, Small, Tubing.

For abstract, see STAR 04 23.

N66-38137 **Field 20I**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
STEADY-STATE COMPOSITION OF A LOW-DENSITY NONEQUILIBRIUM HYDROGEN PLASMA.
by R. Krawec. Oct 66, 20p NASA-TN-D-3457

Descriptors: *Electron energy, *Energy distribution, *Hydrogen plasma, *Maxwell distribution, *Plasma composition, Composition, Distribution, Energy, Equation, Function, Low density, Nonequilibrium, Plasma, State, Steady, Temperature.

For abstract, see STAR 04 23.

N66-38342 **Field 20I, 20C**
CFSTI Prices HC$2.00 MF$0.50
Max-planck-institut Fur Physik Und Astrophysik, Munich (West Germany).
AMBIPOLAR DIFFUSION OF A PLASMA CLOUD IN A MAGNETIC FIELD.
by G. Haerendel, and M. Scholer. May 66, 30p
MPI-PAE/EXTRATERR.-26/66

Descriptors: *Ambipolar diffusion, *Magnetic field, *Plasma cloud, Charge, Coefficient, Current, Differential, Diffusion, Electric, Equation, Field, Gas, Ion, Ionized, Partial, Particle, Plasma, Rotating.

For abstract, see STAR 04 23.

N66-38497 **Field 20I**
CFSTI Prices HC$3.00 MF$0.75
United Aircraft Corp., East Hartford, Conn. Research Labs.
INVESTIGATION OF COLLISION PROBABILITY OF ELECTRONS AND IONS WITH ALKALI METAL ATOMS FINAL REPORT, 22 APR. 1964 - 21 JUL. 1966.
by R. H. Bullis, and W. L. Nighan. 12 Oct 66, 106p
NASA-CR-72076, UACRL-E-920243-27
Contract NAS3-4171

Descriptors: *Alkali metal, *Cesium, *Collision, *Electron, Arc, Atom, Converter, Cross section, Discharge, Ion, Mobility, Momentum, Plasma, Property, Ramsauer effect, Thermionic, Transfer, Transport.

For abstract, see STAR 04 23.

N66-38710 **Field 20I**
CFSTI Prices HC$2.00 MF$0.50
Michigan Univ., Ann Arbor. Dept. Of Electrical Engineering.
MEASUREMENTS OF PLASMA ENERGY DENSITY AND CONDUCTIVITY FROM 3 TO 120 KILOBARS.
by J. W. Robinson. 1966, 39p NASA-CR-78481
Grant NSG-415
Submitted For Publication

Descriptors: *Energy density, *Plasma conductivity, Calculation, Conductivity, Density, Detonation, Discharge, Energy, Equation, Measurement, Particle, Peak, Plasma, Pressure, Range, Shield, State.

For abstract, see STAR 04 23.

PB-173 386 **Field 20I, 18A**
CFSTI Prices: HC$4.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
GENERATION D'HARMONIQUES DE LA DEMI-FREQUENCE GIROMAGNETIQUE ELECTRONIQUE DANS UN SYSTEME 'DOUBLE-FAISCEAU' (The Generation of Harmonics of the Electron Cyclotron Half-Frequency in a Double-Beam Interaction Experiment),
by Jack Olivain. Sep 66, 110p CEA-R-3075
Text in French; attached summary in English.

Descriptors: (*Plasma medium, *Cyclotron resonance phenomena), Particle beams, Plasma medium, Harmonic analysis, Plasma oscillations, Special functions (Mathematical), France.

The generation of harmonics of the electron cyclotron half-frequency in a double-beam interaction experiment was studied. A theoretical discussion is presented in which the transverse velocity distributions are represented by Dirac delta functions. The experimental measurements show the structure of the waves generated, their azimuthal wave number, wave length and radial profile of the oscillating potential, density and current. The quasi-electrostatic character of these waves was established from these results. Measurements were also made of the amplitudes and line-widths of several harmonics as well as the growth rate of the first of them. Finally, a number of observations were made which show that non-linear wave interactions play an important role in this system and which suggest an interpretation based on this mechanism for the generation of high order harmonics. (Author)

PB-173 392 **Field 20I, 18A**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
EFFET D'UN CHAMP MAGNETIQUE UNIFORME SUR LES PROFILS DES RAIES DE L'HYDROGENE (The Effect of an Homogeneous Magnetic Field on the Line Profiles of Hydrogen),
by Hoe Nguyen, Hans-Werner Drawin, and Louis Herman. Aug 66, 76p CEA-R-3057
Text in French; attached summary in English.

Descriptors: (*Plasma medium, Magnetic fields), (*Hydrogen, *Line spectrum), Electric fields, Electrons, Stark effect, Gas discharges, France.

Identifiers: Zeeman effect.

The profiles of the hydrogen lines have been calculated taking into account the intermolecular electric field, the electronic collisions, and an external homogeneous magnetic field in which the plasma is imbedded. For very small magnetic fields our calculated line profiles coincide with the pure Stark profiles recently calculated by Griem, Kolb and Shen (see PB-144 638). With increasing magnetic fields, important deviations appear. The essential parameters for these deviations are, firstly: the direction of observation with regard to the direction of the magnetic field, and secondly: the ratio between the Zeeman splitting in a magnetic field only and the Stark splitting due to the mean intermolecular electric field. Experimental line profiles have been obtained using a linear discharge tube surrounded by an induction coil. The comparison of the theoretical profiles with the experimental ones shows a satisfying agreement. The results for the lines originating from higher principal quantum numbers are actually exploited and will be communicated soon. (Author)

AD-641 848 **See Field 7D**

AD-641 851 **See Field 5A**

N66-38343 **See Field 4A**

20J. QUANTUM THEORY

AD-641 451 **Field 20J, 20H**
Not available from CFSTI.
California Univ., Berkeley. Dept. of Physics.
MODEL OF WEAK INTERACTIONS WITH CP VIOLATION.
Revised ed.,
by S. L. Glashow. 30 Nov 64, 5p
Grant AF-AFOSR-232-63
Proj. AF-9751
Task 975101
AFOSR-66-0831
Revision of manuscript submitted 4 Nov 64.
Availability: Published in Physical Review Letters v14 n1 p35-8 Jan 4 1965.

Descriptors: (*Nuclear reactions, Mathematical models), Invariance, Groups (Mathematics), Matrix algebra, Decay schemes, Leptons, Pions, Pair production.

Identifiers: CP invariance, Weak interactions.

A simple model of weak interactions is proposed which allows for CP violation. A single current-current coupling is introduced where vector and axial-vector currents transform differently under SU (3), yet each transforms like a member of a unitary octet. (Author)

AD-641 552 **Field 20J, 20H**
Not available from CFSTI.
Yale Univ., New Haven, Conn. Dept. of Physics.
EXPANSION THEOREM FOR FUNCTIONS OF OPERATORS,
by Leon Cohen. 13 Jul 65, 4p
Grant AF-AFOSR-843-65
Proj. AF-9767
Task 976702
AFOSR-66-1589
Availability: Published in Journal of Mathematical Physics v7 n2 p244-5 Feb 1966.

Descriptors: (*Operators (Mathematics), *Functions), (*Theorems, Functions), Real numbers, Wave functions, Momentum, Series, Matrix algebra.

Identifiers: Annihilation operators, Creation operators.

A method is given for expanding operator functions of q and p such that all q factors are to the left of the p factors. The method is applicable to the rearrangement of creation and annihilation operators. (Author)

AD-641 553 **Field 20J, 20H**
Not available from CFSTI.
Yale Univ., New Haven, Conn. Dept. of Physics.
TRANSFORMATION OF OPERATORS,
by Leon Cohen. 8 Oct 65, 10p
Grant AF-AFOSR-843-65
Proj. AF-9767
Task 976702
Availability: Published in American Journal of Physics v34 n8 p684-90 Aug 1966.

Descriptors: (*Operators (Mathematics), *Transformations (Mathematics)), Momentum, Wave functions, Complex variables, Matrix algebra, Harmonic generators.

Identifiers: Annihilation operators.

A method is given for the transformation of operators from one representation to another. Explicit expressions are derived. The transformation to complex valued representation is also considered. (Author)

AD-641 616 **Field 20J, 20H**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
OPERATOR AND GENERALIZED GAUGE TRANSFORMATIONS IN QUANTUM ELECTRODYNAMICS,
by C. S. Lam. 24 May 65, 13p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0814
Availability: Published in Nuovo Cimento v41 (S10) p193-203 Jan 1966.

Descriptors: (*Green's function, Field theory), (*Field theory, Transformations (Mathematics)), Operators (Mathematics), Matrix algebra, Quantum mechanics, Electrons, Vector analysis.

Identifiers: Feynman rules, Gauge theory.

Previous studies on the relations between Green's functions are generalized. In the majority of the published literature dealing with this problem, gauge transformations are defined through the change of a generating functional, or equivalently, through certain specified changes of the Feynman rules. The connection between this definition, and the definition of defining a gauge transformation by the addition of the gradient of an operator-valued gauge function to the electromagnetic potential (operator gauge transformation), is studied. It is found that each operator gauge transformation from the radiation gauge may be defined through certain modifications of the Feynman rules in that gauge. However, usually it consists of more modifications than those assumed before. These modifications due to an operator gauge transformation are all of a special type. Modifications of other type may be included, which serves to define generalized gauge transformations. An example of a generalized gauge transformation is given in which the interacting electron propagator coincided with the free one outside any prespecified space-time domain. This example serves to illustrate the many other possibilities of gauge transformations that have not been considered before. A theorem giving a relation between the electron Green's functions in different gauges is also proved. (Author)

AD-641 617 **Field 20J, 20H**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
FEYNMAN RULES AND FEYNMAN INTEGRALS FOR SYSTEM WITH HIGHER-SPIN FIELDS,
by C. S. Lam. 8 Mar 65, 12p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0799
Availability: Published in Il Nuovo Cimento v38 (S10) p1755-64 Aug 16 1965.

Descriptors: (*Field theory, Equations), (*Nuclear spins, Field theory), Hamiltonian, S-matrix, Operators (Mathematics), Integrals, Special functions (Mathematical), Vector analysis, Mesons, Photons, Wave functions, Bosons.

Identifiers: Feynman integrals, Feynman rules.

It is known that Feynman rules for many systems may be expressed by replacing the interaction Hamiltonian in the Dyson formula by minus the interaction Lafrangian, provided suitable covariant changes of the time-ordered functions between some fields are also made. The general conditions for which this is valid are investigated and the result is stated. In case this is not valid, a general, straight-forward procedure for computing the extra vertices is given which is considerably simpler than the usual Dyson-Wick procedure. This procedure is illustrated by an explicit example dealing with charged vector electrodynamics. It also follows from these investigations that the integrand for the Feynman path integral is not always simply the exponential of i times the action. This simple prescription fails whenever an extra vertex for the Feynman rule occurs, and the correct expressions in these cases are given. (Author)

AD-641 618 **Field 20J, 20H**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
A USEFUL RELATION AMONG CASIMIR OPERATORS,
by M. Resnikoff. 8 Nov 65, 4p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0817
Availability: Published in Physics Letters v19 n7 p596-7 Dec 15 1965.

Descriptors: (*Elementary particles, *Operators (Mathematics)), Groups (Mathematics), Matrix algebra, Vector analysis, Quantum mechanics.

Identifiers: Casimir operators, Symmetry (Quantum mechanics).

The new extension of group theoretical methods, the 'dynamical' groups, now require a knowledge of the Casimir operators Cp for the group SU (n). It is the purpose of this note to point out a rather simple method of obtaining these numbers for the group SU (n), in general. (Author)

AD-641 619 **Field 20J, 20H**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
USE OF UNITARITY IN PROVING POMERANCHUK'S THEOREM ON CROSS SECTIONS AT HIGH ENERGIES,
by R. J. Eden. 16 Nov 65, 5p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0821
Availability: Published in Physical Review Letters v16 n1 p39-41 Jan 3 1966.

Descriptors: (*Nuclear cross sections, *Field theory), (*Elementary particles, Nuclear cross sections), (*Antiparticles, Nuclear cross sections), Nuclear scattering, Equations, Functions, Elastic scattering.

Identifiers: Pomeranchuk's theorem, Unitarity.

Pomeranchuk suggested in 1956 that total cross sections for particle-particle and for particle-antiparticle scattering become equal in the limit of high energy. All proofs make assumptions about analyticity, crossing symmetry, and temperedness, which have to a large extent been established from the axioms of quantum field theory. In addition, two assumptions are made which have not been shown to have the same support from axiomatic field theory. The first extra assumption limits the rate of change of the difference between particle and antiparticle cross sections. The second additional assumption limits the rate of change of the modulus of the difference between the corresponding amplitudes. It is the purpose of this Letter (a) to note first the essential role of the above assumptions in proofs of the Pomeranchuk theorem; (b) to observe that if one considers only forward scattering there is no obvious reason why the second assumption should be valid except when phi (E) is chosen to increase so fast that the Froissart bound is violated; (c) to note that within certain limits on the rate of change of the total particle and antiparticle cross sections, the second assumption can be replaced by unitarity.

AD-641 622 **Field 20J, 20H**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
V (THETA)-BOUND STATE AND UNIQUENESS IN THE THREE-PARTICLE SECTOR OF THE LEE MODEL,
by Antonio Pagnamenta. 13 May 65, 12p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0878
Availability: Published in Journal of Mathematical Physics v7 n2 p356-65 Feb 1966.

Descriptors: (*V particles, *Wave functions), (*Mesons, Wave functions), Potential theory, Equations, Vector analysis, Elastic scattering, Nuclear particles, Integral equations.

Identifiers: Theta mesons, Bound particles.

If the coupling constant is large enough, but still smaller than its critical value, there exists a V (Theta)-bound state in the Lee model. The bound-state wavefunction was found via the solution of the homogeneous Kallen-Pauli equation. The condition for the existence of a V (Theta)-bound state gives a statement about the uniqueness of the scattering solutions of both the V (Theta)- and N2 (Theta)-integral equations. There exists no N2 (Theta)-bound state if the V particle is unstable. (Author)

AD-641 625 **Field 20J, 20H**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
FICTITIOUS NATURE OF 'CORE TERM' IN EXCHANGE AMPLITUDE FOR ELECTRON-ATOM SCATTERING,
by Ik-Ju Kang, and J. Sucher. 10 Dec 65, 5p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0818
Prepared in cooperation with Massachusetts Univ., Amherst.
Availability: Published in Physics Letters v20 n1 p22-4 Jan 15 1966.

Descriptors: (*Electrons, Scattering), (*Nuclear scattering, Wave functions), Atoms, Electron bombardment, Quantum mechanics, Bosons, Hydrogen, Approximation (Mathematics), Potential theory.

Identifiers: Bound particles.

The so-called 'core-term' in the exchange amplitude for electron-atom scattering, given in many books and papers, is shown to be fictitious. The theoretical foundations of some successful approximate calculations of such scattering are thereby clarified. (Author)

AD-641 627 **Field 20J**
Not available from CFSTI.
Maryland Univ., College Park. Dept. of Physics and Astronomy.
EQUIVALENCE OF LOCALITY AND PARALOCALITY IN FREE PARAFIELD THEORY,
by H. Araki, O. W. Greenberg, and J. S. Toll. 13 Sep 65, 3p
Grant AF-AFOSR-500-64
Proj. AF-9751
Task 975101
AFOSR-66-0797
Availability: Published in Physical Review v142 n4 p1017-8 Feb 25 1966.

Descriptors: (*Functional analysis, *Field theory), Green's function, Selection rules, Relativity theory, Quantum mechanics.

Identifiers: Parafields.

It is shown that locality, i.e., vanishing of the commutator at space-like separation in the parafield Hilbert space A, implies paralocality, i.e., vanishing of the commutator at space-like separation in the larger Green component Hilbert space B. This demonstration removes an unanated assumption in a recent derivation of parafield selection rules. The method of demonstration yields the general statement that the vacuum is separating for polynomials of localized free parafields in the representation on the space B. (Author)

AD-641 630 **Field 20J**
Not available from CFSTI.
Syracuse Univ., N. Y.
PHYSICS AND GEOMETRY,
by Peter G. Bergmann. 1964, 6p
Grant AF-AFOSR-509-64
Proj. AF-9767
Task 976704
AFOSR-66-1334
Availability: Published in Proceedings of the 1964 International Congress for Logic, Methodology and Philosophy of Science, Jerusalem, p343-6 Aug 26-Sep 2 1964.

Descriptors: (*Relativity theory, *Differential geometry), Physics, Geometry, Algebraic topology.

Physics and Geometry is a talk given by P. G. Bergmann at the 1964 International Congress for Logic, Methodology, and Philosophy of Science held in Jerusalem Aug 26 - Sep 2, 1964. The content of the talk is primarily concerned with general relativity, and with the relationship between physics and geometry suggested by that theory. (Author)

AD-641 678 **Field 20J, 20L**
Not available from CFSTI.
Battelle Memorial Inst., Columbus, Ohio.
EVALUATION OF SOME TRANSPORT INTEGRALS,
by I. Adawi, and M. L. Glasser. 6 Aug 65, 4p
Grants AF-AFOSR-260-63, AF-AFOSR-640-64
Proj. AF-9761
Task 976101
AFOSR-66-1301
Availability: Published in Journal of Applied Physics v37 n1 p364-6 Jan 1966.

Descriptors: (*Integrals, *Transport properties), (*Quantum statistics, Integrals), Distribution functions, Thermal conductivity, Metals, Electrons, Scattering.

The transport integrals for Fermi-Dirac (+) and Bose-Einstein (-) statistics are expressed simply in terms of tabulated functions. Some examples from the theory of lattice thermal conductivity and electron-electron collisions in metals are discussed. The related integrals are also evaluated. (Author)

AD-641 680 **Field 20J, 12A**
Not available from CFSTI.
Texas Univ., Austin.
NOTE ON THE BONDI-METZNER-SACHS GROUP,
by E. T. Newman, and R. Penrose. 28 Oct 65, 10p
Grant AF-AFOSR-454-63
Proj. AF-9749
Task 974901
AFOSR-66-1199
Prepared in cooperation with Pittsburgh Univ., Pa., and Birkbeck Coll., London (England).
Availability: Published in Journal of Mathematical Physics v7 n5 p863-70 May 1966.

Descriptors: (*Groups (Mathematics), *Relativity theory), Potential theory, Differential geometry.

Identifiers: Bondi-Metzner-Sachs group.

It is shown that, in space-times which are asymptotically flat, there are reasonable physical restrictions that allow one to impose coordinate conditions (in addition to the usual Bondi-type conditions) which restrict the allowed coordinate group to a subgroup of the Bondi-Metzner-Sachs group. This subgroup is isomorphic to the improper orthochronous inhomogeneous Lorentz group. (Author)

AD-641 682 **Field 20J**
Not available from CFSTI.
Texas Univ., Austin.
10 EXACT GRAVITATIONALLY-CONSERVED QUANTITIES,
by E. T. Newman, and R. Penrose. 28 Jun 65, 4p
Grant AF-AFOSR-454-63
Proj. AF-9749
Task 974901
AFOSR-66-1413
Prepared in cooperation with Pittsburgh Univ., Pa. and Birkbeck Coll., London (England).
Availability: Published in Physical Review Letters v15 n6 p231-3 Aug 9 1965.

Descriptors: (*Gravity, *Relativity theory), Differential geometry, Quadrupole moments, Invariance, Wave functions, Field theory, Dipole moments, Great Britain.

Identifiers: Gravitational radiation, Space-time symmetries.

The paper is concerned with a discussion of 10 exact gravitationally conserved quantities. In ordinary electromagnetic theory, total charge remains exactly constant for any system surrounded by source-free space. This is a direct consequence of Maxwell's equations for the free-space region, whereas dipole and higher moments can be carried away by electromagnetic radiation. In gravitational theory, analogs of this conserved charge would at first sight appear to be mass, momentum, and angular momentum, as they are indeed exactly conserved in the linearized Einstein theory for regions surrounded by empty space. However, in the full nonlinear theory mass and momentum can be changed by gravitational radiation. It has therefore been commonly believed that there are no exactly conserved gravitational quantities in general relativity. But i is found out quite unexpectedly, that there is a set of 10 geometrical quantities, defined for asymptotically flat space-times, which have a quadrupole structure and whose values cannot be altered in any way by gravitational radiation. (Author)

AD-641 722 **Field 20J**
Not available from CFSTI.
Maryland Univ., College Park. Inst. of Fluid Dynamics and Applied Mathematics.
A NEW METHOD IN THE THEORY OF POTENTIAL SCATTERING,
by R. P. Gilbert, and S. Y. Shieh. 26 Jul 65, 6p
Grant AF-AFOSR-400-64
Proj. AF-9749
Task 974901
AFOSR-66-1205
Availability: Published in Journal of Mathematical Physics v7 n3 p431-3 Mar 1966.

Descriptors: (*Potential scattering, Theory), Integrals, Numerical methods and procedures, Series, Potential theory, Momentum.

A new method is given for investigating the position, number, and type of singularities the scattering amplitude may have as a function of complex momentum transfer. The advantage of this method over ones relying on the Watson transform is that one needs only to know the partial amplitudes for physical values of the angular momentum. (Author)

AD-641 832 **Field 20J, 5I**
CFSTI Prices: HC$5.00 MF$1.00
Illinois Univ., Urbana. Coordinated Science Lab.
LECTURES ON RELATIVITY THEORY,
by John Ray. Aug 66, 161p R-311
Contract DA-28-043-AMC-00073 (E), Grant NsG-443
Proj. DA-20014501B31F

Descriptors: (*Relativity theory, Education), Mechanics, Transformations (Mathematics), Dynamics, Tensor analysis, Differential geometry.

Identifiers: Lectures.

The lectures were given to graduate and undergraduate engineering and science students during the spring semester, 1966. The lectures cover both the special and general theories. The coverage of the special theory is fairly complete while that of the general theory is somewhat abbreviated due to lack of time. The lectures on the general theory stopped with the derivation of the Schwartzschild solution and a discussion of the linear theory. (Author)

AD-641 908 **Field 20J, 20H**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.
COMPLEX RELATIVITY THEORY AND WAVE MECHANICS, (Ia),
by Andre Gleyzal. 30 Sep 66, 47p NOLTR-66-189, Mathematic Dept-M-67

Descriptors: (*Relativity theory, *Field theory), Wave functions, Complex variables, Functions, Quantum mechanics, Equations of motion, Elementary particles, Tensor analysis, Algebraic topology, Differential geometry.

This paper endeavors to show that a mathematically defined complex gravitational world represents the physical world and provides a unified field theory of relativity. The motion and the de Broglie wave psi of a complex particle M = m + ie/square root of gamma in a world W (M sub o), where M sub o = m sub o + ie sub o/square root of gamma are given. (Author)

N66-33174 **Field 20J**
CFSTI Prices HC$1.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
AN APPRAISAL OF FOPIM FAST-CONVERGING PERTURBATION METHOD.
by J. O. Hirschfelder, J. H. Huntington, and P. D. Robinson. 19 Nov 64, 22p NASA-CR-59677, WIS-TCI-73
Grant NSG-275-62
Submitted For Publication

Descriptors: *Iteration, *Perturbation, *Quantum mechanics, Atom, Convergence, First, Ground, Harmonic, Hydrogen, Linear, Mechanics, Method, Order, Oscillator, Quantum, State.

For abstract, see STAR 04 19.

N66-33380 **Field 20J**
CFSTI Prices HC$2.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
DIFFERENT SCREENING CONSTANTS FOR DIFFERENT PHYSICAL PROPERTIES, I.
by J. O. Hirschfelder, and W. A. Sanders. 13 Nov 64, 45p NASA-CR-59676, WIS-TCI-71
Grant NSG-275-62
Submitted For Publication

Descriptors: *Astronomy, *Ground state, *Quantum mechanics, *Theoretical physics, *Wave function, Algebra, Atom, Calculation, Charge, Constant, Electron, Embedding, Function, Ground, Mechanics, Nuclear, Physics, Quantum, Screening, State, Theory, Two, Wave.

For abstract, see STAR 04 19.

N66-33385 **Field 20J**
CFSTI Prices HC$1.00 MF$0.50
Haverford Coll., Pa. Strawbridge Observatory.
OSCILLATOR STRENGTHS AND HIGH ACCURACY WAVE FUNCTIONS FOR NEUTRAL HELIUM.
by L. C. Green, N. C. Johnson, and E. K. Kolchin. 1963, 20p NASA-CR-59516
Grant NSG-287, Contract NONR-1727/00/
Submitted For Publication

Descriptors: *Electron transition, *Field strength, *Oscillator, *Quantum mechanics, Center, Computation, Electron, Field, Function, Helium, Mechanics, Neutral, Physics, Quantum, Strength, System, Transition, Two, Wave.

For abstract, see STAR 04 19.

N66-33420 **Field 20J**
CFSTI Prices HC$1.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
SOME REMARKS ON THE USE OF THE VARIATIONAL PRINCIPLE FOR THE SECOND ORDER ENERGY.
by J. H. Epstein, and S. T. Epstein. 16 Nov 64, 8p NASA-CR-59726, WIS-TCI-72
Grant NSG-275-62
Submitted For Publication

Descriptors: *Energy level, *Ground state, *Quantum mechanics, *Variational principle, *Wave function, Approximation, Energy, Function, Ground, Level, Mechanics, Principle, Quantum, State, Variation, Wave.

For abstract, see STAR 04 19.

N66-34067 **Field 20J**
CFSTI Prices HC$2.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
RESEARCH RELATED TO AN EXPERIMENTAL TEST OF GENERAL RELATIVITY SEMIANNUAL STATUS REPORT, 1 JAN. - 30 JUN. 1966.
by D. Alpert, and H. Knoebel. Jul 66, 29p NASA-CR-77108
Grant NSG-443

Descriptors: *Gyroscope, *Materials science, *Photographic apparatus, *Relativity theory, *Satellite configuration, Apparatus, Computer, Configuration, Digital, Drag, Gas, General, Heating, Material, Mirror, Orbit, Photographic, Regression, Relativity, Satellite, Science, Simulation, Theory.

For abstract, see STAR 04 19.

AD-641 490 **See Field 20H**

AD-641 504 **See Field 20N**

AD-641 626 **See Field 20H**

AD-641 631 See Field 20C

AD-641 635 See Field 20C

AD-641 681 See Field 20D

AD-641 721 See Field 12A

AD-641 730 See Field 20D

AD-641 737 See Field 12A

AD-641 755 See Field 3C

AD-641 779 See Field 12A

AD-641 783 See Field 20C

AD-641 811 See Field 7E

AD-641 847 See Field 7D

AD-641 889 See Field 20L

20K. SOLID MECHANICS

AD-448 045 **Field 20K**
CFSTI Price: HC$3.00
Toronto Univ. (Ontario). Inst. for Aerospace Studies.
TURBULENCE-INDUCED PANEL VIBRATION,
by M. Y. elBaroudi. Feb 64, 91p UTIAS-98
Contract AF 49 (638)-249, Grant AF-AFOSR-62-267
AFOSR-64-0883
Supported in part by Defence Research Board of Canada, grant DRB-9551-02.

Descriptors: (*Turbulence, Boundary layer), (*Boundary layer, Noise), (*Airplane panels, Vibration), Theory, Fluid flow, Pressure, Excitation, Statistical analysis, Correlation techniques, Measuring devices (Electrical+ electronic), Surface properties, Panels (Structural), Correlators, Damping, Simulation, Airplane noise, Aerodynamic characteristics, Sound transmission.

Motivated by the problem of boundary-layer induced panel noise, a detailed study has been made of the transverse vibration of 11 x 11 inch steel panels flush-mounted in the wall of a turbulent flow duct. Panel thicknesses were .002 and .008 inch. Duct cross sections were 1 x 12 and 8 x 12 inches, and flow speeds were about 60 to 200 feet per second. The characteristics of the exciting pressure field at the wall and of the resultant vibration of the sample panels were investigated using statistical techniques. Relief charts of the experimental two-point space-time correlation of panel vibration versus longitudinal separation and time-delay showed pronounced oblique ridges and valleys discernable in a more random pattern. These are interpreted as running waves (with a speed equal to that of the pressure field convection) with an irregular pattern superposed. Such running waves were predicted by Ribner's idealized infinite-panel model of the flexural response. On the other hand, a superposition of stationary unsteady oscillations in the various modes of a finite panel forms the basis of the more realistic but more complex theories. To test the compatibility, Dyer's idealized theoretical model of the panel response was developed and programmed for a digital computer. (Author)

AD-450 669 **Field 20K, 13M**
CFSTI Price: HC$6.00
Michigan Univ., Ann Arbor. Coll. of Engineering.
DYNAMIC PRESSURE DISTRIBUTION AT THE BASE OF A RIGID FOOTING SUBJECTED TO VIBRATORY LOADS,
by Y. S. Chae. May 64, 216p Rept. no. 3-88
Contract DA-22-079-eng-340
Proj. ORA-05366

Descriptors: (*Foundations (Structures), Loading (Mechanics)), Cylindrical bodies, Pressure, Soil mechanics, Load distribution, Vibrations, Mathematical analysis, Theory, Experimental data.

This thesis is an experimental study of the behavior of footing-soil systems subjected to vibratory loads. The base of the footing consisted of six independent concentric circular rings connected through load cells to a rigid mass. The footing, resting on the surface of a sand bed, was set into steady state vibration by an electromagnetic oscillator. From measurements of the periodic variations of loads on each ring, the inertia force of the mass, and the input force, it was possible to obtain information on the changes in distribution of dynamic pressure amplitude. The phase relations for the six segments of the footing base, and data needed to establish empirical values for the displacement functions associated with the theoretical approach. The experimental results were analyzed and compared with the theoretical work, which regarded the system to be an idealized circular mass resting on the surface of a homogeneous, isotropic, semi-infinite elastic body. (Author)

AD-480 198 **Field 20K, 13H, 11F**
CFSTI Prices: HC$4.00 MF$0.75
Illinois Univ., Urbana. Dept. of Civil Engineering.
FATIGUE OF PLATES AND WELDMENTS IN HY-100 AND HY-130/150 steels,
by W. H. Munse, W. H. Bruckner, J. B. Radziminski, R. W. Hinton, and J. W. Leibold. Nov 65, 121p
Structural Research Ser-300
Contract NObs-92226
Proj. SR-007-01-01
Task 855

Descriptors: (*Fatigue (Mechanics), Steel), (*Metal plates, Fatigue (Mechanics)), (*Welds, Fatigue (Mechanics)), Defects (Materials), Non-destructive testing, Radiography, Ultrasonic radiation, Fracture (Mechanics), Metallography.

Identifiers: Steel HY-100, Steel HY-130/150.

An evaluation of the axial fatigue behavior of plain plates and full penetration weldments in HY-100 steel is presented. Transverse butt-welded specimens welded with the Mil-11018 electrodes were found to contain minute internal weld flaws which often serve as critical locations for fatigue crack initiation. The weld flaws, although not detected by usual radiographic inspection, were successfully located with the use of ultrasonic detection equipment. The ultrasonic equipment was used also to study the initiation and propagation of fatigue cracks in several test weldments. A preliminary investigation of the axial fatigue behavior of HY-130/150 steel plain plates is reported. (Author)

AD-641 497 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
California Inst. of Tech., Pasadena. Div. of Engineering and Applied Science.
TRANSFER OF LOAD FROM AN EDGE-STIFFENER TO A SHEET- A RECONSIDERATION OF MELAN'S PROBLEM.
Technical rept.,
by Rokuro Muki, and Eli Sternberg. Sep 66, 37p
TR-7
Contract Nonr-220 (58)
Proj. NR-064-431

Descriptors: (*Elasticity, *Loading (Mechanics)), Stresses, Sheets, Mechanical properties, Numerical analysis, Modulus of elasticity.

Identifiers: Melan's problem.

The problem posed by the diffusion of load from an infinite edge-stiffener into a semi-infinite elastic sheet is reconsidered under two alternative refinements of the underlying stiffener model. First, the stiffener is regarded as an elastic strip of finite width and the theory of generalized plane stress is applied rigorously to the sheet and stiffener alike. Next, Melan's one-dimensional treatment of the stiffener is amended to account for its bending rigidity. The 'exact' and the intermediate approximate solution thus obtained are compared to Melan's results with particular attention to the relevant asymptotic behavior in the vicinity of the applied load and at large distances from the load. Comparative numerical results, showing the variation of the sheet stresses at the interface and the distribution of the axial stiffener force, are included. (Author)

AD-641 535 **Field 20K**
Not available from CFSTI.
Illinois Univ., Urbana. Dept. of Physics.
LINEAR RESPONSE FUNCTIONS AND THE PHENOMENOLOGICAL EQUATIONS OF INTERNAL FRICTION.
Interim rept.,
by F. Garcia-Moliner, and R. Thomson. 8 Jul 65, 9p
Grant AF-AFOSR-803-65
Proj. AF-9761
Task 976101
AFOSR-66-1321
Availability: Published in Journal of Applied Physics v37 n1 p83-9 Jan 1966.

Descriptors: (*Internal friction, Mathematical analysis), Functional analysis, Equations of motion, Integral transforms, Fourier analysis.

Identifiers: Kramers-Kronig relations.

Linear response function analysis has been applied to the internal friction problem. With the use of the Kramers-Kronig relations, the analysis takes on a very convenient form which is of particular usefulness for experimental analysis. The Fourier transform of the response function is related very simply to the phase lag and the modulus defect. The general formulation is applied to simple cases of relaxation and resonance. It is also applied to the space-dependent vibrating dislocation model of Granato and Lucke, and the effects of higher modes are treated. It is shown that on the high-frequency side of the damping peak, for low damping, the higher modes contribute an increase in the damping which has the same frequency dependence as the fundamental. For high damping, the situation is indeterminate on the far high-frequency side, but for frequencies near the peak, the fundamental mode analysis of Granato and Lucke is unchanged. (Author)

AD-641 555 **Field 20K**
Not available from CFSTI.
Duke Univ., Durham, N. C. Dept. of Mathematics.
A TWO-DIMENSIONAL CRACK PROBLEM,
by M. Lowengrub. 12 Jan 66, 14p
Grant AF-AFOSR-435-63
Proj. AF-9749
Task 974901
AFOSR-66-1414
Prepared in cooperation with North Carolina State Coll., Durham, Contract AF 49 (638)-1159; University of Southern California, Contract AF 49 (638)-893.
Availability: Published in International Journal Engineering Sciences v4 p289-99 1966.

Descriptors: (*Fracture (Mechanics), Stresses), Distribution, Elasticity, Boundary value problems, Integral transforms, Deformation.

A study was made to determine the distribution of stress in the neighborhood of a crack in an infinitely long elastic strip. Throughout, it is assumed that the equations of the classical theory of elasticity hold. Two types of boundary value problems are considered. First, it is assumed that the edges of the strip are given a uniform displacement e and also that the free edges of the strip are pulled by a uniform tension p. By the use of Fourier transforms the problem is reduced to solving a single

Fredholm equation of the second kind. Analytical expressions are derived for the shape of the deformed crack and for the crack energy. (Author)

AD-641 557 **Field 20K**
Not available from CFSTI.
Wesleyan Univ., Middletown, Conn.
SOME DUAL TRIGONOMETRIC EQUATIONS WITH AN APPLICATION TO ELASTICITY,
by M. Lowengrub. 26 Jun 65, 14p
Grant AF-AFOSR-435-63
Proj. AF-9749
Task 974901
AFOSR-66-1838
Availability: Published in Int. J. Engng. Sci. v4 p69-79 1966.

Descriptors: (*Elasticity, Integral equations), Theory, Stresses, Fracture (Mechanics).

In this note solutions to the pair of integral equations are obtained, integral from 0 to infinity 1/xi psi (xi)K (xix)d xi = f (x), x epsilon (0,1), integral from 0 to infinity psi (xi)K (xix) d xi = g (x), x epsilon (1, infinity) where K (xi, x) is either sin xi x or cos xi x, f (x) epsilon C (0,1) and g (x) epsilon C (1, infinity). These results are then applied to the problem of determining the stress field due to the presence of a crack located externally in a semi-infinite two dimensional elastic medium. (Author)

AD-641 649 **Field 20K, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE USE OF OPTICALLY ACTIVE COATINGS IN THE SOLUTION OF PLANE ELASTO-PLASTIC PROBLEMS,
by A. F. Mozhanskaya, A. P. Fedorov, and N. A. Flerova. 13 Apr 66, 11p FTD-TT-65-1991 TT-66-62564
Unedited rough draft trans. of Sudostroenie (USSR) v31 n1 p21-3 1965.

Descriptors: (*Optical coatings, Optical analysis), (*Deformation, Optical analysis), Elasticity, Plasticity, Surface properties, Epoxy plastics, Polarization, Plasticizers, USSR.

The tests conducted permitted the development of a prescription and of a technology for the preparation of an optically active coating of epoxy resins of the EDP and EDL brand, with a maximum relative deformation of 6 - 7%. On the basis of a study of the relaxation properties of materials obtained from modified epoxy resins, optimum prescriptions are presented for research of deformation of the order of 10 - 12%. The possibility of the utilization of polyethyl carbamate as a photoelastic coating is shown. A composition of cold hardening glue was developed which provides a satisfactory adherence of the epoxy and the polyethyl carbamate coating to various materials. (Author)

AD-641 653 **Field 20K, 11B, 20B**
CFSTI Prices: HC$5.00 MF$1.25
Pennsylvania State Univ., University Park. Materials Research Lab.
THE ELASTIC CONSTANTS OF SOME ALKALI HALIDES AS A FUNCTION OF TEMPERATURE AND COMPOSITION.
Technical rept., Jun 61-Nov 65, no. 3,
by Otis D. Slagle. 1 Oct 66, 199p
Contract Nonr-656 (27)
Thesis on ONR proj. Anisotropy and Strength of Ceramic Bodies.

Descriptors: (*Alkali metal compounds, *Elasticity), (*Sodium compounds, Elasticity), (*Potassium compounds, Elasticity), (*Cesium compounds, Elasticity), Halides, Chlorides, Bromides, Iodides, Thermal properties, Solid solutions, Crystal lattices, Ultrasonic radiation, Phase studies, Transformations.

Identifiers: Cesium bromide, Cesium chloride, Cesium iodide, Potassium bromide, Potassium chloride, Sodium chloride.

The temperature dependence of the elastic constants was measured with high precision for NaCl, KCl, KBr, CsCl, CsBr and CsI and for the solid solution series KCl-KBr in the temperature range 25C to 400C. In the solid solution series KCl-KBr the general trend of the elastic constants versus composition was in agreement with theory but indicated that the dependency on interionic distance is greater than theoretically predicted. (Author)

AD-641 846 **Field 20K**
Not available from CFSTI.
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
FORCED MOTIONS OF AN ENCASED CYLINDER OF DECREASING THICKNESS,
by Jan D. Achenbach, and G. Herrmann. 1966, 10p
Availability: Published in Journal of the Acoustical Society of America v39 n6 p1145-53 Jun 1966.

Descriptors: (*Cylindrical bodies, Motion), Elastic shells, Pressure, Strain (Mechanics), Elasticity, Viscoelasticity, Shear stresses, Oscillation, Vibration, Resonant frequency.

A hollow cylinder was encased in a thin elastic shell and subjected to a time-harmonic pressure at the inner surface of the cylinder. Plane strain and axial symmetry were assumed. The material of the cylinder was incompressible in bulk and both elastic and viscoelastic behavior in shear were considered. The inner radius of the cylinder increased monotonically with time. The influence of loss of mass and stiffness on the forced motion of the system was considered. The oscillatory motion consisted of the superposition of a maintained vibration and a transient term. The maintained vibration took into account the loss of mass and stiffness in a quasistatic manner. For an encased viscoelastic cylinder, the transient term was damped rapidly. A bounded resonance effect occurred when the instantaneous frequency of the system passed through the value of the external forcing frequency. (Author)

AD-641 874 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.
A STUDY OF THE ROLE OF MECHANICAL-STRENGTH PROPERTIES ON THE PHENOMENA OF SPALLATION,
by Robert Piacesi, and James W. Watt. 4 Jan 66, 32p NOLTR-66-42, Ballistics Research-157

Descriptors: (*Impact tests, Aluminum alloys), (*Spallation, Impact shock), Hypervelocity projectiles, Shock (Mechanics), Shock waves, Thickness, Deformation, Mechanical properties.

An experimental investigation was made to determine the role of mechanical-strength properties on the spallation phenomena due to hypervelocity impact. The size of the impacting particle and the thickness of the target were held constant, while the impacting velocity and the yield strength of the target were varied. The spall location, the magnitude of the shock wave arriving at the target's rear surface, and the amount of bulging of the spall piece were measured. The bulging could be predicted with theory to good agreement.

AD-641 971 **Field 20K**
CFSTI Prices: HC$5.00 MF$1.00
Technion - Israel Inst. of Tech., Haifa. Dept. of Aeronautical Engineering.
EXPERIMENTAL AND THEORETICAL STUDIES ON BUCKLING OF CONICAL AND CYLINDRICAL SHELLS UNDER COMBINED LOADING.
Final rept.,
by Josef Singer, Avraham Berkovits, Tanchum Weller, Ori Ishai, and Ovadia Harari. Jun 66, 156p TAE-48
Grant AF-EOAR-58-63
Proj. AF-9782
Task 978201
AFOSR-66-2589

Descriptors: (*Structural shells, *Buckling (Mechanics)), (*Conical bodies, Buckling (Mechanics)), (*Cylindrical bodies, Buckling (Mechanics)), Stability, Aluminum alloys, Loading (Mechanics), Pressure, Polyester plastics, Stiffened cylinders, Israel.

Results of an experimental program on the instability of unstiffened aluminum-alloy conical shells under combinations of 3 loadings, axial compression, torsion and external or internal pressure are presented and compared with linear theory. Improvements in experimental technique permitted many repeated buckling tests on the same metal specimen without noticeable damage and yielded reliable interaction curves. Some tests on Mylar conical shells under similar combined loading, are then discussed. Tests of the mechanical properties of Mylar A sheets revealed considerable anisotropy that casts some doubt on the reliability of results obtained with Mylar specimens. The general instability of stiffened cylindrical shells under combined axial compression and external or internal pressure is then discussed and design implications are considered. The variation of stiffener spacing in stiffened conical shells yields an improvement in structural efficiency. Optimization studies that investigate this improvement for ring stiffened cones in detail are presented. Results of a continuation of an experimental program on the general instability of ring-stiffened conical shells are presented. Tests on integrally machined steel specimens under torsion, axial compression and combined torsion and axial compression are discussed and compared with theory. (Author)

AD-641 984 **Field 20K, 14E**
Not available from CFSTI.
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
PHOTOELASTIC STUDIES OF DYNAMIC STRESSES IN HIGH MODULUS MATERIALS,
by Paul D. Flynn. 14 Mar 66, 10p
Proj. DA-1P014501B33A
FA-A66-10
Presented at the Society's Technical Conference, May 3, 1966, Washington, D. C.
Availability: Published in Journal of the Society of Motion Picture and Television Engineers v75 n8 p729-35 Aug 1966.

Descriptors: (*Materials, Photoelasticity), Stresses, High-speed photography.

Ultra-high-speed photography is needed to record transient stress patterns in models made from high modulus photoelastic materials. A unique photooptical system was developed to obtain simultaneous normal and oblique incidence dynamic stress patterns at rates up to 1,000,000 frames/s. Comparing the photoelastic results with strain gage measurements demonstrated the usefulness of the oblique incidence method for separating principal stresses under dynamic conditions in a circular disc. Dynamic values of the stress-optic coefficient, Young's modulus, and Poisson's ratio were determined from photoelastic and strain gage measurements of elastic waves in a bar. Examples of stress wave propagation in transparent, two-dimensional models were studied using these techniques. (Author)

N66-32725 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
LARGE DEFLECTION AND STABILITY ANALYSIS BY THE DIRECT STIFFNESS METHOD.
by H. C. Martin. 1 Aug 66, 42p NASA-CR-76892, JPL-TR-32-931
Contract NAS7-100

Descriptors: *Computer method, *Deflection, *Elastic stability, *Matrix analysis, Analysis, Application, Computer, Deformation, Digital, Elasticity, Equation, Equipment, Loading, Matrix, Method, Nonlinear, Numerical, Plate, Problem, Procedure, Rotation, Stability, Stiffness, Structure, Theory.

For abstract, see STAR 04 19.

N66-33024 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
Midwest Research Inst., Kansas City, Mo.
FLUTTER OF MULTIPLE-STREAMWISE BAY RECTANGULAR PANELS AT LOW SUPERSONIC MACH NUMBER.
by D. R. Kobett. Aug 66, 35p NASA-CR-538
Contract NAS1-4900

Descriptors: *Flutter analysis, *Rectangular plate, *Supersonic flow, Aerodynamics, Analysis, Array, Bay, Coupling, Damping, Flow, Flutter, Galerkin method, Multiple, Panel, Plate, Rectangle, Stability, Stream, Structural, Supersonic.

For abstract, see STAR 04 19.

N66-33025 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
Pittsburgh Univ., Pa.
THE EIGENVALUE PROBLEM FOR BEAMS AND RECTANGULAR PLATES WITH LINEARLY VARYING IN-PLANE AND AXIAL LOAD.
by G. Fauconneau, and W. M. Laird. Aug 66, 36p NASA-CR-549
Grant NSG-634

Descriptors: *Axial load, *Eigenvalue, *Rectangular plate, *Structural beam, Approximation, Axial, Beam, Linear, Load, Plane, Plate, Problem, Rectangle, Solution, Structural, Variation.

For abstract, see STAR 04 19.

N66-33172 **Field 20K**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
STRUCTURAL APPLICATIONS FOR ADVANCED COMPOSITE MATERIALS.
by N. J. Mayer. 1964, 18p NASA-TM-X-54860

Descriptors: *Composite material, *Materials science, *Physical property, *Structural material, Application, Composite, Material, Optimization, Physical, Prediction, Property, Science, Spacecraft, Structural.

For abstract, see STAR 04 19.

N66-33350 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
FLUTTER INVESTIGATION AT A MACH NUMBER OF 7.2 OF MODELS OF THE HORIZONTAL-TAIL AND VERTICAL- TAIL SURFACES OF THE X-15 AIRPLANE.
by F. W. Gibson, and J. S. Mixson. May 59, 29p NASA-MEMO-4-14-59L

Descriptors: *Supersonic flutter, *Tail surface, *Wind tunnel model, *X- 15 aircraft, Aerodynamic, Characteristics, Elevator, Flutter, Horizontal, Model, Pressure, Rudder, Supersonic, Surface, Tail, Tunnel, Vertical, Vibration, Wind.

For abstract, see STAR 04 19.

N66-33351 **Field 20K**
CFSTI Prices HC$6.36 MF$3.00
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
NACA CONFERENCE ON AIRCRAFT LOADS, FLUTTER, AND STRUCTURES - A COMPILATION OF THE PAPERS PRESENTED.
1955, 586p NASA-TM-X-57821
Conf. Held At Langley Field, Va., 2-4 Mar. 1955

Descriptors: *Aircraft structure, *Buffeting, *Conference, *Flutter, *Loading, Aerodynamic, Aircraft, Characteristics, Control, Deflection, Failure, Fatigue, Ground, Gust, Heating, Panel, Stress, Structure, Surface, Water, Wing.

For abstract, see STAR 04 19.

N66-33369 **Field 20K**
CFSTI Price MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
EFFECT OF TARGET MATERIAL YIELD STRENGTH ON HYPERVELOCITY PERFORATION AND BALLISTIC LIMIT.
by E. T. Kruszewski, and R. G. Thomson. 1964, 48p NASA-TM-X-54874
Presented At The 7th Hypervelocity Impact Symp., Tampa, Fla., 17-19 Nov. 1964

Descriptors: *Hypervelocity projectile, *Penetration ballistics, *Thin plate, *Viscoplastic flow, Analysis, Ballistics, Flow, Hypervelocity, Material, Penetration, Perforation, Plate, Projectile, Strength, Theory, Thin, Viscoplasticity.

For abstract, see STAR 04 19.

N66-33375 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
Alabama Univ., University. Bureau Of Engineering Research.
ON CONICAL SHELLS OF LINEARLY VARYING THICKNESS SUBJECTED TO LATERAL NORMAL LOADS PROGRESS REPORT NO. 1.
by C. H. Chang. Feb 65, 33p NASA-CR-62481
Contract NAS8-11155

Descriptors: *Conical shell, *Stress and load, *Thickness ratio, Algebra, Basic, Bending, Conical, Displacement, Equation, Lateral, Linearity, Load, Membrane, Ratio, Shell, Solution, Stress, Subjection, Thickness, Variable.

For abstract, see STAR 04 19.

N66-33381 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
Georgia Inst. Of Tech., Atlanta.
DYNAMIC RESPONSE OF A CYLINDRICAL SHELL SEGMENT SUBJECTED TO AN ARBITRARY LOADING.
by W. Stadler, and J. T. Wang. 1965, 29p NASA-CR-67184
Grant NSG-571
Presented At 9th Midwestern Mech. Conf., Madison, Wisc., 16-18 Aug. 1965 Submitted For Publication

Descriptors: *Blast loading, *Cylindrical shell, *Dynamic response, Analysis, Blast, Cylinder, Dynamics, Load, Response, Segment, Shell, Shock, Subject, Support, Underground, Wave.

For abstract, see STAR 04 19.

N66-33400 **Field 20K**
CFSTI Prices HC$1.00 MF$0.50
Wichita Univ., Kans. Dept. Of Aeronautical Engineering.
SOME FREE VIBRATION AND DYNAMIC RESPONSE PROBLEMS ASSOCIATED WITH CENTRIFUGALLY STABILIZED DISK AND SHELL STRUCTURES SEMIANNUAL PROGRESS REPORT, 15 FEB. - 15 AUG. 1966.
by W. Eversman. Aug 66, 14p NASA-CR-77014
Contract NGR-17-00O3-004

Descriptors: *Annular plate, *Centrifugal force, *Disk, *Free vibration, *Natural frequency, Annulus, Centrifugal, Diameter, Differential, Equation, Force, Free, Frequency, Hub, Mode, Natural, Node, Normal, Plate, Shell, Stabilization, Structure, Vibration.

For abstract, see STAR 04 19.

N66-33456 **Field 20K**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
VIBRATIONAL CHARACTERISTICS OF SANDWICH PANELS IN A REDUCED-PRESSURE ENVIRONMENT.
by C. A. Powell Jr, and D. G. Stephens. Aug 66, 19p NASA-TN-D-3549

Descriptors: *Honeycomb core, *Polyurethane foam, *Sandwich construction, *Vibration measurement, Acoustic, Construction, Core, Damping, Density, Environment, Foam, Frequency, Honeycomb, Measurement, Mechanics, Natural, Polyurethane, Pressure, Radiation, Sandwich, Structural, Vibration.

For abstract, see STAR 04 19.

N66-33460 **Field 20K**
CFSTI Prices HC$3.00 MF$0.75
Stanford Univ., Calif.
AN EXPERIMENTAL STUDY OF THE BUCKLING OF COMPLETE SPHERICAL SHELLS.
by R. L. Carlson, N. J. Hoff, and R. L. Sendelbeck. Aug 66, 65p NASA-CR-550
Grant NSG-630

Descriptors: *Buckling, *Pressure effect, *Spherical shell, Effect, Electroforming, Flaw, Loading, Mechanics, Performance, Pressure, Shell, Spherical, Structural, Test.

For abstract, see STAR 04 19.

N66-33465 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
California Inst. Of Tech., Pasadena.
THE INFLUENCE OF THE BOUNDARY CONDITIONS ON THE BUCKLING LOAD OF CYLINDRICAL SHELLS UNDER AXIAL COMPRESSION.
by S. Kobayashi. Aug 66, 29p NASA-CR-558
Grant NSG-18-59

Descriptors: *Axial compression, *Buckling, *Cylindrical shell, Axial, Boundary, Compression, Cylinder, Deformation, Elastic, Linear, Load, Mechanics, Shell, Stress, Structural, Theory, Thin, Wall.

For abstract, see STAR 04 19.

N66-33572 **Field 20K**
CFSTI Prices HC$3.25 MF$1.25
De Havilland Aircraft Co., Ltd., Malton (Ontario). Special Products And Applied Research Div.
TEST PROGRAM ON THIN-WALLED TUBES WITH ZERO THERMAL GRADIENT FINAL REPORT.
by J. Flood, H. S. Kerr, and R. Spencer. 1966, 198p NASA-CR-76917, DHC-SP-R.168-2
Contract NAS5-9572

Descriptors: *Deflection, *Radiant heating, *Test program, *Thermal absorption, *Thin wall, *Tube, Absorption, Bending, Characteristic, Heating, Hole, Pattern, Power, Program, Radiance, Random, Spiral, Stem, Surface, Test, Thermal, Thin, Wall.

For abstract, see STAR 04 19.

N66-33595 **Field 20K**
CFSTI Prices HC$4.00 MF$0.75
Louvain Univ. (Belgium). Dept. Of Applied Mechanics.
DYNAMIC BEHAVIOR OF SHELLS UNDER THERMAL STRESS SCIENTIFIC REPORT.
by F. Buckens. 1965, 124p AFOSR-66-0898, AD-634109
Contract AF-EOAR-63-49

Descriptors: *Circular cylinder, *Dynamic response, *Thermal stress, *Thin walled shell, Bending, Circular, Cylinder, Dynamic, Elasticity, Mechanical, Propagation, Response, Stress, Structural, Thermal, Vibration, Wave.

For abstract, see STAR 04 19.

N66-33970 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
THERMAL DISTORTIONS OF THIN-WALLED PARABOLOIDAL SHELLS.
by J. E. Walz. Aug 66, 45p NASA-TN-D-3543

Descriptors: *Parabola, *Shell theory, *Thin walled shell, Axisymmetry, Behavior, Distortion, Equation, Linear, Loading, Mathematics, Paraboloid, Plot, Revolution, Rotation, Shell, Solution, Thermal.

For abstract, see STAR 04 19.

N66-37936 **Field 20K, 13I**
CFSTI Prices HC$2.00 MF$0.50
United Kingdom Atomic Energy Authority, Risley (England). Reactor Engineering Lab.
FRICTION AND WEAR BEHAVIOR OF SLIDING BEARING MATERIALS IN SODIUM ENVIRONMENTS AT TEMPERATURES UP TO 600 DEG C.
by W. H. Roberts. 1966, 44p TRG-1269/R/
Submitted For Publication

Descriptors: *Bearing, *Sliding friction, *Sodium, *Wear, Alloy, Argon, Chromium, Effect, Environment, High temperature, Impurity, Liquid, Lubrication, Molybdenum, Oxygen, Steel, Stellite, Tungsten, Vapor.

For abstract, see STAR 04 23.

N66-38362 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
Harvard Univ., Cambridge, Mass.
IMPERFECTION-SENSITIVITY OF EXTERNALLY PRESSURIZED SPHERICAL SHELLS.
by J. W. Hutchinson. Oct 65, 27p NASA-CR-68613, SM-5
Grant NSG-559
Submitted For Publication

Descriptors: *Axial compression, *Pressurization, *Spherical shell, Behavior, Buckling, Critical, Cylinder, Deflection, Displacement, Equation, Equilibrium, Geometry, Imperfection, Initial, Large, Mode, Nonlinear, Postbuckling, Sensitivity, Shallow, Small, Strain, Strength, Stress, Wavelength.

For abstract, see STAR 04 23.

N66-38411 **Field 20K**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
TEST OF A LARGE-DIAMETER RING-STIFFENED CYLINDER SUBJECTED TO HYDROSTATIC PRESSURE.
by D. A. Dow, and J. P. Peterson. Oct 66, 21p NASA-TN-D-3647

Descriptors: *Buckling, *Hydrostatic pressure, *Stiff structure, Cylinder, External, Failure, Mechanics, Pressure, Ring, Shell, Stability, Structural, Test.

For abstract, see STAR 04 23.

N66-38412 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
COMPARISON OF PANEL FLUTTER RESULTS FROM APPROXIMATE AERODYNAMIC THEORY WITH RESULTS FROM EXACT INVISCID THEORY AND EXPERIMENT.
by S. C. Dixon. Oct 66, 28p NASA-TN-D-3649

Descriptors: *Aerodynamics, *Flutter analysis, *Panel flutter, Aircraft, Dynamic, Instability, Inviscid, Skin, Surface, Theory.

For abstract, see STAR 04 23.

N66-38719 **Field 20K**
CFSTI Prices HC$2.00 MF$0.50
Drexel Inst. Of Tech., Philadelphia, Pa.
A UNIFIED APPROACH TO ONE-DIMENSIONAL ELASTIC WAVES BY THE METHOD OF CHARACTERISTICS.
by P. C. Chou, and R. W. Mortimer. Apr 66, 45p NASA-CR-78493
Grant NSG-270-63

Descriptors: *Characteristic method, *Elastic wave, *Partial differential equation, Calculation, Characteristics, Dependence, Differential, Elastic, Equation, Hyperbola, Method, Partial, Problem, Propagation, Variable, Wave.

For abstract, see STAR 04 23.

N66-38752 **Field 20K**
CFSTI Prices HC$1.00 MF$0.50
California Univ., Los Angeles.
AN INVESTIGATION OF CERAMICS AS STRUCTURAL MATERIALS.
by W. J. Knapp, P. Kurtz Jr, and F. R. Shanley. Oct 66, 20p NASA-CR-632
Grant NSG-427

Descriptors: *Ceramics, *Prestressing, *Structural material, Aerospace, Beam, Bending, Characteristics, Dome, Fabrication, Load, Plate, Stiffness, Strength, Stress, Thermal.

For abstract, see STAR 04 23.

PB-173 409 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.50
Illinois Univ., Urbana. Dept. of Civil Engineering.
A PRACTICAL ANALYSIS OF THE ANCHORAGE ZONE PROBLEM IN PRESTRESSED BEAMS.
Cooperative Highway Research Program, PARTS 1 AND 2,
by Rolf J. Lenschow, and Mete A. Sozen. Jan 66, 52p Ser-47
Pub. in Journal of the American Concrete Institute, Proceedings v62 n11 Nov 1965.

Descriptors: (*Beams (Structural), Stresses), Reinforcing materials, Concrete, Design, Fracture (Mechanics), Mathematical analysis.

The paper presents methods for (a) the determination of transverse stresses and (b) the proportioning of transverse reinforcement in the anchorage zone of prestressed concrete beams. The methods presented are based on a physical analog representing the end of the beam. Part I of the paper describes the basic features of the approach, compares the results with others based on theory and experiment, develops simple design procedures, and concludes with numerical examples. Part 2 discusses in detail the derivations associated with the development of the physical analog. (Author)

AD-462 843 See Field 11F

AD-468 171 See Field 11F

AD-641 405 See Field 5A

AD-641 651 See Field 12A

AD-641 693 See Field 11J

AD-641 707 See Field 12A

AD-641 881 See Field 12A

AD-641 965 See Field 13M

AD-641 990 See Field 11F

AD-641 995 See Field 11F

PB-173 413 See Field 11F

20L. SOLID STATE PHYSICS

AD-274 969 **Field 20L**
CFSTI Price: HC$4.60
Ohio State Univ., Research Foundation, Columbus.
THE DEPENDENCE OF THE DIFFUSIVITIES OF IMPURITIES IN SILICON ON BACKGROUND DOPING AND SURFACE CONCENTRATION.
Quarterly technical rept. no. 4, 1 Oct-31 Dec 61,
by M. O. Thurston, and Joseph Tsai. Feb 62, 46p RF-1233-4Q
Contract DA-36-039-SC-87426
Continuation of Contract DA-36-039-SC-83874.
See also AD-285 171,-411 143, -443 869.

Descriptors: (*Semiconductors, Silicon compounds), (*Silicon, *Doping), Duffusion, Antimony, Boron, Phosphorus, Oxides, Resistance (Electrical), Electrical conductance.

It was observed experimentally that the diffusivities in Si of P, B, and Sb depend slightly on background doping level when the level is below 10 to the 18th power/cc. Although it is known that the diffusivity is a function of concentration, and Fick's Law in simple form is not valid for high concentrations, it was found that simple diffusion theory gives a good approximation in some instances. Experimentally it appears that sheet resistance, surface concentration, and junction depth can be related adequately for many purposes if the distribution is assumed to be of the complementary error function form but with an effective diffusion constant differing from Fuller's value. (Author)

AD-452 983 **Field 20L, 9C**
CFSTI Price: HC$25.10
Stanford Univ., Calif. Stanford Electronics Labs.
QUARTERLY RESEARCH REVIEW NO. 9, 1 APRIL THROUGH 30 JUNE 1964.
30 Jun 64, 255p SU-SEL-64-073
Contracts AF 33 (657)-11586, DA-36-039-sc-85339

Descriptors: (*Electronics laboratories, Research program administration), Semiconductor devices, Physics laboratories, Masers, Plasma physics, Interferometers, Solid state physics, Gallium compounds, Electron guns, Conductivity, Charged particles, Electron beams, Cryogenics, Pattern recognition, Meteors, Ionosphere, Epitaxial growth, Control systems.

AD-641 363 **Field 20L, 10B, 8G, 7B K**
CFSTI Prices: HC$5.00 MF$1.00
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
SYNTHESIS AND OPTICAL PROPERTIES OF FORSTERITE.

Technical rept.,
by T. J. Shankland. Jul 66, 170p HP-16
Contract Nonr-1866 (10)
Proj. NR-017-308

Descriptors: (*Minerals, Synthesis (Chemistry)), (*Magnesium compounds, Single crystals), (*Silicates, Single crystals), Crystal growth, Absorption spectrum, Electrical conductance, Dielectrics, Impurities, Doping, Iron, Band theory of solids, Hall effect, Photoconductivity, Electron transitions.

Identifiers: Forsterite, Magnesium silicate.

The report describes the growth of what are believed to be the first synthetic single crystals of appreciable size of forsterite, Mg2SiO4, and the measurement of optical absorption in these crystals. A limited number of measurements of electrical conductivity as a function of temperature were also made. It is shown that the pure magnesium orthosilicate is a very good insulator, and that the interesting optical properties observed in natural olivines are due to the presence of iron. (Author)

AD-641 400 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Delaware Univ., Newark. Dept. of Physics.
INJECTION CAUSED p-N JUNCTION IN CdS.
Technical rept.,
by K. W. Boer, and J. J. Ward. Oct 66, 25p TR-15
Grant Nonr (G)-4336 (00)

Descriptors: (*Semiconductors, Electrical properties), (*Cadmium compounds, Sulfides), Carriers (Semiconductors), Photoconductivity, Infrared radiation, Voltage.

Identifiers: Cadmium sulfide.

It is observed using the Franz-Keldysh effect that certain 'very pure' CdS crystals show a high field layer close to, but well separated from, a hole injecting anode (Au). This layer is identified as a p-n junction caused by hole injection. Inversion of a IR quenching spectrum into a similar IR excitation spectrum is observed at an applied voltage where this high field layer becomes 'visible', and explained as caused by a current controlling p-type region in CdS. (Author)

AD-641 498 **Field 20L, 20E, 9A**
CFSTI Prices: HC$3.00 MF$0.75
Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH.
Quarterly technical summary, 1 May-31 Jul 66,
by Alan L. McWhorter. 11 Oct 66, 68p LL-1966:3
Contract AF 19 (628)-5167
Proj. 649L
ESD-TR-66-403
See also AD-639 064.

Descriptors: (*Solid state physics, Scientific research), (*Semiconductor devices, Solid state physics), (*Lasers, Solid state physics), (*Materials, Solid state physics), Band theory of solids, Pumping (Optical), Semiconductors, Luminescence, Magnetism, Cryogenics, Scattering, Plasma physics.

This report covers in detail the solid state research work at Lincoln Laboratory for the period 1 May through 31 July 1966. The topics covered are Solid State Device Research, Optical Techniques and Devices, Materials Research, and Physics of Solids. (Author)

AD-641 522 **Field 20L**
Not available from CFSTI.
City Coll. of the City of New York.
INFRARED ABSORPTION OF UNIAXIALLY STRESSED GERMANIUM.
Interim rept.,
by J. F. Aschner, and E. Erlbach. 24 Jun 65, 8p
Grant AF-AFOSR-175-63
Proj. AF-9763
Task 976302
AFOSR-66-1523
Revision of manuscript submitted 9 Apr 65.
Availability: Published in Journal of Physics and Chemistry of Solids v26 p2078-80 1965.

Descriptors: (*Germanium, Absorption), Infrared radiation, Stresses, Band theory of solids, Electron transitions, Measurement, Semiconductors.

It has been known for some time that the application of hydrostatic pressure will alter the band structure of semiconductors, resulting in a shift of the position of the absorption edge. In the present this paper reports the change both in the position and the shape of the indirect absorption edge caused by uniaxially stressing intrinsic germanium. Specifically, the change delta alpha in the absorption coefficient alpha for the transition Gamma sub 25' yields L sub 1 was measured. (Author)

AD-641 523 **Field 20L**
Not available from CFSTI.
City Coll. of the City of New York.
POLARIZATION DEPENDENCE OF THE INDIRECT PIEZOABSORPTION COEFFICIENT IN Ge AND Si.
Interim rept.,
by E. Adler, and E. Erlbach. 7 Oct 65, 5p
Grant AF-AFOSR-175-63
Proj. AF-9763
Task 976302
AFOSR-66-1635
Availability: Published in Physical Review Letters v16 n3 p87-9 Jan 17 1966.

Descriptors: (*Piezoelectric effect, Polarization), (*Germanium, Optical properties), (*Silicon, Optical properties), Absorption spectrum, Stresses, Band theory of solids, Deformation.

It has recently been shown that measurements of the polarization dependence of the piezoreflectance in Ge and Si can give detailed information on the nature of the transitions involved. These measurements were in the energy region corresponding to direct transitions. A report is now given on the polarization dependence of piezoabsorption measurements in the indirect absorption region from which one can directly obtain information on the sign of the deformation-potential constants which are only indirectly obtainable otherwise. In addition, information is obtained about the symmetry of the intermediate state of the indirect transition. Furthermore, it may be possible that these techniques can be used to obtain the same information for materials with degenerate valence bands similar to those in germanium and silicon. It is verified that the valence-band deformation potentials in germanium are both negative. (Author)

AD-641 538 **Field 20L, 20B, 20H**
Not available from CFSTI.
Syracuse Univ., N. Y. Dept. of Physics.
APPROACHES TO PIEZOELECTRICITY AND ELASTICITY IN MIXED IONIC COVALENT COMPOUNDS.
Interim rept.,
by Harvey Kaplan. 1963, 13p
Grant AF-AFOSR-420-63
Proj. AF-9763
Task 976302
AFOSR-66-1614
Availability: Published in Lattice Dynamics, Proceedings of the International Conference, Copenhagen, Denmark p615-24 August 5-9 1963.

Descriptors: (*Piezoelectric crystals, Solid state physics), (*Elasticity, Solid state physics), Crystal lattices, Dynamics, Quantum mechanics, Atomic structure, Valence, Semiconductors.

The problems of calculating the elastic and piezoelectric responses of mixed ionic covalent compounds are reviewed using the sphalerite and wurtzite structures as examples. Most of the discussion centers around the piezoelectric constant. A brief survey of the experimental situation is followed by a simple demonstration of the origin of piezoelectricity via Jaffe's model for sphalerite. The various lattice dynamical models of piezoelectricity in sphalerite are discussed in detail. The situation in wurtzite and the relations between the constants in sphalerite and wurtzite are discussed briefly. The roles of piezoelectricity and elasticity as two facets of lattice dynamics are emphasized. It is concluded that the presently available experimental data on lattice dynamical properties and the lattice dynamics analysis does not allow unique values of important parameters such as the ionic charge to be determined. A number of suggestions are made for detailed quantum mechanical calculations of elastic and piezoelectric constants. (Author)

AD-641 547 **Field 20L**
Not available from CFSTI.
Syracuse Univ., N. Y.
PHOTOEXCITED ELECTRON CAPTURE BY IONIZED AND NEUTRAL SHALLOW IMPURITIES IN SILICON AT LIQUID-HELIUM TEMPERATURES,
by M. Loewenstein, and A. Honig. 8 Nov 65, 10p
Grant AF-AFOSR-425-63
Proj. AF-9763
Task 976302
AFOSR-66-1653
Availability: Published in Physical Review v144 n2 p781-8 Apr 15 1966.

Descriptors: (*Silicon, Impurities), (*Semiconductors, *Electron capture), Phosphorus, Arsenic, Antimony, Bismuth, Boron, Aluminum, Gallium, Indium, Carriers (Semiconductors), Cryogenics, Paramagnetic resonance, Photoconductivity, Ions, Probability.

The capture rates for photoexcited electrons due to ionized phosphorus, arsenic, antimony, and bismuth donors as well as neutral boron, aluminum, gallium, and indium acceptors in silicon were determined in the liquid-helium temperature region, using combined optical and paramagnetic resonance techniques. The ionized-donor capture rates exceed by about an order of magnitude the values predicted from the theories of Lax and of Ascarelli and Rodgiguez for capture of thermalized electrons. The capture rates are independent of temperature between 1 and 4K, at variance with both theories, and their dependence on the ionization energy of the different donors also does not conform to the theoretical predictions. These results, as well as photoconductivity measurements as a function of charged-impurity concentration, demonstrate the inadequacy of any existing model of the low-temperature donor capture process for photoexcited electrons in silicon. Possible explanations of the results in terms of nonrandom impurity clusters or capture from hot-electron states are presented. The neutral-acceptor rates are about two orders of magnitude smaller than those of the ionized donors, are also independent of temperature between 1 and 4K, and show a small dependence of about 1/1 sq on the hole ionization energy of the impurities, compared with expected 1/T sq and I to the -3/2 power dependences from the theory for thermalized-electron capture by neutral centers. As in the case of the ionized donors, no presently available model appears adequate to explain the results. (Author)

AD-641 549 **Field 20L, 20C**
Not available from CFSTI.
Michigan State Univ., East Lansing. Dept. of Physics and Astronomy.
MAGNETIC AND CALORIC PROPERTIES OF K3MoCl6,
by P. A. van Dalen, H. M. Gijsman, N. Love, and H. Forstat. 1965, 5p

Grant AF-AFOSR-430-63
Proj. AF-9763
Task 976303
AFOSR-66-1632
Prepared in cooperation with Technische Hogeschool, Eindhoven (Netherlands).
Availability: Published in Low Temperature Physics-LT9 ptB p888-91 1965.

Descriptors: (*Molybdenum compounds, Physical properties), Potassium compounds, Chlorides, Molybdates, Magnetic properties, Calorimetry, Specific heat, Transition temperature, Cryogenics, Entropy, Antiferromagnetism, Netherlands.

Identifiers: Potassium hexachloromolybdate, Magnetic susceptibility.

The susceptibility of powdered K3MoCl6 was measured in the temperature range of 1-300K. The salt was commercially obtained and had a purity of about 98%. Calorimetric experiments were made on a sample of the same origin. (Author)

AD-641 550 **Field 20L, 20C**
Not available from CFSTI.
Michigan State Univ., East Lansing. Dept. of Physics and Astronomy.
FURTHER EVIDENCE FOR A MAGNETIC TRANSITION IN MnCl2. (NH2)2CS)4,
by H. Forstat, N. D. Love, and J. McElearney.
24 Jan 66, 3p
Grant AF-AFOSR-430-63
Proj. AF-9760
Task 976002
AFOSR-66-1376
Availability: Published in J. Phys. Soc. Japan v21 p808 1966.

Descriptors: (*Complex compounds, *Antiferromagnetism), (*Manganese compounds, Complex compounds), (*Thiourea, Complex compounds), Magnetic properties, Transformations, Calorimetry, Specific heat, Entropy, Cryogenics, Chlorides.

Identifiers: Tetrakis (Thiourea) manganese dichloride.

The specific heat of MnCl2. ((NH2)2CS)4 was measured in the temperature range 0.47-3.75K using a He3 calorimeter. A x-type magnetic transition has been observed at 0.58 plus or minus 0.02K, indicating a paramagnetic antiferromagnetic transition which confirms the findings using nmt and magnetic susceptibility techniques. The specific heat results were compared with those calculated from magnetic susceptibility results, using the Fisher relationship. Agreement appears to be very satisfactory. (Author)

AD-641 551 **Field 20L, 20C**
Not available from CFSTI.
Michigan State Univ., East Lansing. Dept. of Physics and Astronomy.
MAGNETIC TRANSITION IN THIOUREA-COORDINATED COBALT CHLORIDE,
by H. Forstat, N. D. Love, J. McElearney, and H. Weinstock. 22 Dec 65, 6p
Grant AF-AFOSR-430-63
Proj. AF-9760
Task 976002
AFOSR-66-1335
Availability: Published in The Physical Review v145 n2 p406-9 May 13 1966.

Descriptors: (*Complex compounds, *Antiferromagnetism), (*Cobalt compounds, Complex compounds), (*Thiourea, Complex compounds), Magnetic properties, Transformations, Calorimetry, Specific heat, Anomalies, Entropy, Anisotropy, Crystal lattices, Cryogenics, Chlorides.

Identifiers: Tetrakis (Thiourea), Cobalt dichloride.

Specific-heat measurements were made on a single crystal of CoCl2. ((NH2)2CS)4 in the temperature range 0.42 -13.9K. A lambda-type anomaly was observed at TN = -.92K and is associated with a paramagnetic-antiferromagnetic transition. The total entropy change associated with the magnetic transition is 1.38 cal/mole deg and is completely accounted for from the expected value of R log (2S+1) where S=1/2 for the Co (++) ion. Ap. proximately 47% of this entropy change occurs above 0.92K. The specific-heat results are in reasonable agreement with the calculated from magnetic susceptibility measurements from 0.42K to 0.92K but are somewhat lower above 0.92K. Furthermore, the specific-heat measurements give slightly higher magnetizations than those expected from the molecular-field theory. These comparisons indicate that cobalt thiourea chloride is considerably anisotropic and that a two-sublattice model of nearest-neighbor interactions does not suffice to explain the spin arrangements for Co (++) ions. (Author)

AD-641 621 **Field 20L**
Not available from CFSTI.
Case Inst. of Tech., Cleveland, Ohio. Dept. of Physics.
CYCLOTRON RESONANCE IN ZINC,
by M. P. Shaw, P. I. Sampath, and T. G. Eck. 12 Aug 65, 9p
Grants AF-AFOSR-536-64, AF-AFOSR-62-222
Proj. AF-9763
Task 976302
AFOSR-66-1737
Availability: Published in The Physical Review v142 n2 p399-405 Feb 11 1966.

Descriptors: (*Zinc, *Cyclotron resonance phenomena), Cryogenics, Atomic energy levels, Atomic orbitals, Band theory of solids, Superhigh frequency.

Identifiers: Fermi surfaces.

Azbel-Kaner cyclotron resonance was studied at 24 Gc/sec and 2K in the (10-10), (11-20), and (0001) planes of zinc. Twelve distinct mass series were identified and their mass values determined as a function of the orientation of the magnetic field in the sample surface. All of the observed signals are felt to arise from carriers in orbits on either the lens-shaped electron surface in the third band or the hole surface in the second band. One of the mass series is assigned to a limiting-point resonance associated with the electrons on the spherical caps of the 'lens.' (Author)

AD-641 634 **Field 20L**
Not available from CFSTI.
California Univ., Riverside. Dept. of Physics.
DIELECTRIC CONSTANT OF A SEMICONDUCTOR IN AN EXTERNAL ELECTRIC FIELD,
by K. S. Viswanathan, and Joseph Callaway. 8 Sep 65, 6p
Grant AF-AFOSR-523-64
Proj. AF-9763
Task 976302
AFOSR-66-1293
Availability: Published in The Physical Review v143 n2 p564-8 Mar 11 1966.

Descriptors: (*Semiconductors, Dielectric properties), Electric fields, Band theory of solids, Numerical analysis, Gallium alloys, Arsenic alloys.

Identifiers: Gallium arsenide.

The effect of a constant external electric field on the transverse dielectric constant of a semiconductor is calculated. The field produces a sharp decrease in the dielectric constant close to the threshold for an inter-band transition. Above the edge, the behavior is oscillatory. Numerical results have been obtained for gallium arsenide. (Author)

AD-641 636 **Field 20L**
Not available from CFSTI.
California Univ., Riverside. Dept. of Physics.
SOLID STATE SCATTERING THEORY,
by Joseph Callaway. 1966, 19p
Grant AF-AFOSR-523-64
Proj. AF-9763
Task 976302
AFOSR-66-1521
Prepared for presentation at the Theoretical Physics Institute, Colorado Univ., Summer 1965.
Availability: Published in Lectures in Theoretical Physics v8A p295-312 1966.

Descriptors: (*Scattering, Theory), (*Solid state physics, Scattering), Transport properties, Band theory of solids, Crystal lattice defects.

Scattering theory is of interest in solid state physics for several reasons. It is obviously vital in transport theory. (1) In addition it furnishes a convenient method to treat certain bound state problems concerning localized defects, (2) as well as those involving virtual states or resonances within a band. (3) Moreover, through multiple scattering theory at low temperatures, (4) and the virial expansion at high temperatures, (5) it furnishes a practical method of attack on many-body problems in those cases in which the behavior of a low density system of particles is of interest. (Author)

AD-641 739 **Field 20L**
Not available from CFSTI.
California Univ., Berkeley.
ON THE CAPACITY OF COMPOSITE CONDUCTORS,
by M. H. Protter, and H. F. Weinberger. 23 Nov 64, 12p
Grant AF-AFOSR-553-64
Proj. AF-9749
Task 974902
AFOSR-66-1206
Availability: Published in Journal of Mathematics and Physics v64 n4 p375-83 Dec 1965.

Descriptors: (*Potential theory, *Conductivity), Capacitance, Composite materials, Inequalities, Optimization.

AD-641 763 **Field 20L**
Not available from CFSTI.
Washington Univ., Seattle. Dept. of Physics.
INTERNAL FIELD OF Fe57 IN NICKEL FROM 77K TO THE CURIE POINT,
by J. G. Dash, B. D. Dunlap, and D. G. Howard. 20 Aug 65, 6p
Grant AF-AFOSR-594-64
Proj. AF-9763
Task 976303
AFOSR-66-1621
Availability: Published in The Physical Review v141 n1 p376-8 Jan 1966.

Descriptors: (*Iron, Hyperfine structure), (*Mossbauer effect, Iron), Nickel, Impurities, Solid solutions, Magnetic fields, Cryogenics, Magnetic moments.

The internal field of very dilute iron-57 impurities in nickel was measured from 77K to 0.99 Tc. The temperature dependence of the field is not the same as that of the magnetization, the discrepancy reaching 15% at intermediate temperatures. Correction of both magnetization and internal field to constant volume increases the divergence. Over the entire experimental temperature range, the internal field can be represented by a Brillouin function of the form proposed by Jaccarino, Walker, and Wertheim for Mn55 in iron, indicating quasi-independent localized impurity moments. The empirical exchange field between Fe impurities and the Ni host is larger than the field between Ni ions, in contrast to the relatively weaker coupling of Mn in Fe. Therefore, the conditions for quasi-independent localized moments seem to be fulfilled for the case of the substantially stronger, as well as the weaker, couplings, in accord with a prediction of Callen, Hone, and Heeger. (Author)

AD-641 770 **Field 20L**
Not available from CFSTI.
Illinois Univ., Urbana. Dept. of Physics.
K BAND IN COLORED ALKALI HALIDE CRYSTALS,
by D. Y. Smith, and Giorgio Spinolo. 20 Jul 65, 11p
Grant AF-AFOSR-599-64, NSF-GP-2218
Proj. AF-9763
Task 976302
AFOSR-66-1307
Prepared in cooperation with Milan Univ. (Italy). Instituto di Fisica.
Availability: Published in The Physical Review v140 n6A pA2121-29 Dec 13 1965.

Descriptors: (*Alkali metal compounds, Color centers), (*Color centers, Band spectrum), Halides, Crystal lattice defects, Absorption spectrum, Theory, Atomic energy levels, Excitation, Electron transitions, Atomic orbitals, Band theory of solids.

Recently the results of a number of experiments relating to the K band in colored alkali halides have been reported and several new speculations have been put forth concerning this absorption. A comparison of the known properties of the band with the predictions of various theories leads to the conclusion that the available experimental evidence supports the original suggestion of Mott and Gurney that the K band is an absorption of the F center to a series of higher excited states. To provide a semiquantitative theoretical test of this explanation the Simpson model for the F center was investigated in detail. The model problem was solved for the most important higher bound states, and transition energies and oscillator strengths for transitions to these states were calculated. It was found that for reasonable choices of paramenters the model predicts an optical absorption spectrum that is strikingly similar to the composite F-and K-band absorption. Several experimental tests of the Mott-Gurney model are suggested and the possibility of K-band-like absorptions associated with other centers is discussed. (Author)

AD-641 771 **Field 20L**
Not available from CFSTI.
Illinois Univ., Urbana. Dept. of Physics.
OPTICAL ABSORPTION AND PHOTOCONDUCTIVITY IN THE K BAND OF SOME COLORED ALKALI HALIDES,
by Giorgio Spinolo, and D. Y. Smith. 20 Jul 65, 6p
Grants AF-AFOSR-599-64, NSF-GP-2218
Proj. AF-9763
Task 976302
AFOSR-66-1308
Prepared in cooperation with Milan Univ. (Italy). Istituto di Fisica.
Availability: Published in The Physical Review v140 n6A pA2117-20 Dec 1965.

Descriptors: (*Alkali metal compounds, Color centers), (*Rubidium compounds, Color centers), (*Color centers, Band spectrum), Halides, Chlorides, Crystal lattice defects, Absorption spectrum, Photoconductivity, Theory, Atomic energy levels, Electron transitions, Band theory of solids.

Identifiers: Rubidium chloride.

The optical absorption of various alkali halides colored by different methods was measured in the K-band region at liquid-nitrogen and liquid-helium temperatures. Particular attention was devoted to RbCl, in which the K band is well resolved at liquid-helium temperature. It was found that the K band in RbCl is neither symmetric nor Gaussian and that the band has a relatively long high-energy tail. Photoconductivity studies on RbCl demonstrated that there is appreciable photoconductivity only in this high-energy tail. It is concluded that these data support the Mott-Gurney model of the K band which attributes the main part of the K absorption to allowed transitions of the F center to a series of bound excited states beneath the conduction band. (Author)

AD-641 772 **Field 20L, 20B**
Not available from CFSTI.
Battelle Memorial Inst., Columbus, Ohio.
27Al AND 89Y NUCLEAR MAGNETIC RESONANCE IN YTTRIUM-ALUMINUM GARNET,
by K. C. Brog, W. H. Jones, Jr., and C. M. Verber. 22 Jan 66, 5p
Grant AF-AFOSR-585-64
Proj. AF-9761
Task 976103
AFOSR-66-1296
Availability: Published in Physics letters v20 n3 p258-60 Feb 15 1966.

Descriptors: (*Garnet, *Nuclear magnetic resonance), (*Aluminum, Nuclear magnetic resonance), (*Yttrium, Nuclear magnetic resonance), Quadrupole moments, Absorption spectrum, Symmetry (Crystallography), Crystal lattices.

From the aluminum-27 resonances, the values of ((E sq.)qQ)/h were determined to be 0.632 plus or minus 0.005 Mc/s and 6.017 plus or minus 0.017 Mc/s in the trigonal and tetragonal sites respectively. Neither the aluminum-27 nor the yttrium-89 resonances are shifted significantly. (Author)

AD-641 861 **Field 20L, 20A**
Not available from CFSTI.
Wayne State Univ., Detroit, Mich.
ULTRASONIC KJELDAAS-EDGE EXPERIMENT IN POTASSIUM.
Interim rept.,
by R. L. Thomas, and H. V. Bohm. 2 Mar 66, 6p
Grant AF-AFOSR-695-64
Proj. AF-9761
Task 976103
AFOSR-66-1797
Availability: Published in Physical Review Letters v16 n13 p587-9 Mar 28 1966.

Descriptors: (*Potassium, Ultrasonic properties), (*Ultrasonic radiation, Absorption), Atomic energy levels, Nuclear spins, Ground state, Sound, Attenuation, Crystal structure.

Identifiers: Fermi surfaces.

A report is given of the results of an ultrasonic shear-wave experiment proposed by Alig, Quinn, and Rodriguez, (Phys. Rev. Letters v14 p981 1965), to distinguish between a 'quasi-free' electron Fermi surface and a surface modified from this configuration by spin-density wave states (SDW) in accordance with Overhauser's calculations that the electronic ground states of potassium, rubidium, and cesium may be SDW states. The experimental values of the absorption-edge field in potassium reported for various values of the ultrasonic wave number are consistent with theoretically calculated free-electron values rather than the SDW values.

AD-641 887 **Field 20L**
Not available from CFSTI.
Battelle Memorial Inst., Columbus, Ohio. Columbus Labs.
ELECTRON-DENSITY OSCILLATIONS IN A GENERAL POTENTIAL.
Interim rept.,
by I. Adawi. 7 Jan 66, 9p
Grant AF-AFOSR-640-64
Proj. AF-9763
Task 976303
AFOSR-66-1609
Availability: Published in The Physical Review v146 n2 p379-86 Jun 10 1966.

Descriptors: (*Electrons, *Nuclear spins), Electron density, Oscillation, Potential theory, Crystal lattice defects, Impurities, Surface properties, Dielectric properties.

The asymptotic density of a free noninteracting electron gas is discussed in the presence of a general potential V (X), where X is a vector in one, two, and three dimensions corresponding, respectively, to the potential of a surface barrier, an edge dislocation, and an impurity.

AD-641 889 **Field 20L, 20J**
Not available from CFSTI.
Battelle Memorial Inst., Columbus, Ohio.
NOTE ON IONIZED IMPURITY SCATTERING IN SOLIDS.
Revised ed.,
by I. Adawi. 1 Sep 65, 6p
Grant AF-AFOSR-640-64
Proj. AF-9763
Task 976303
AFOSR-66-1600
Revision of manuscript submitted 19 Dec 1964.
Philosophical Magazine v13 n122 p331-5 Feb 1966.

Descriptors: (*Impurities, Scattering), (*Solid state physics, Impurities), Solids, Atomic structure, Ionization, Corrections, Quantum mechanics, Theory, Electron density.

Corrections to the linearized Thomas-Fermi equation are discussed, and the asymptotic nature of the method is described. The contribution of the second-order term to the transport cross section is calculated in the Born approximation, and illustrated by examples covering a wide range of electron densities in solids. (Author)

AD-641 915 **Field 20L, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Eaton Electronics Research Lab., McGill Univ., Montreal (Quebec).
FINE STRUCTURE IN THE ABSORPTION SPECTRA KMnF3 AND RbMnF3.
Technical rept.,
by Richard Stevenson. Oct 66, 15p TR-4
Contract Nonr-3013 (00)
Proj. NR-018-503

Descriptors: (*Manganese compounds, Absorption spectrum), (*Antiferromagnetism, Manganese compounds), Potassium compounds, Fluorides, Cryogenics, Line spectrum, Atomic energy levels, Electron transitions, Selection rules, Magnetic moments, Dipole moments, Electric moments, Nuclear spins.

Identifiers: Manganese potassium fluoride, Manganese rubidium fluoride.

Experimental studies of the absorption spectra in the 3900A region of KMnF3 and RbMnF3 at 4.2K are presented. The spectra of the two substances are almost identical, and show the same number of lines and type of fine structure. The quadruplet-gamma-3 levels, split by the tetragonal component of the crystalline field, are associated with observed transitions at approx. 3939A and 3896A. Definite energy level patterns are found for the weak vibrational lines accompanying these transitions. A sharp and very weak magnetic dipole line M is found (with three components) at approx. 3976A. An electric dipole line P1 at approx. 3966A appears to be a magnon sideband of the magnetic dipole line. M is presumed to be an exciton line associated with the electric dipole transition P2 at approx. 3955A to the main quadruplet-gamma-1 level. The electric dipole lines P1 and P2, associated with the quadruplet-gamma-1 level, show a fine structure which is interpreted in terms of exchange coupled pairs of ions with a Spin hamiltonian-2JS1S2. The selection rule for these transitions is that the total spin of the pair is conserved. (Author)

AD-641 916 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Eaton Electronics Research Lab., McGill Univ., Montreal (Quebec).

HIGH-FIELD ZEEMAN EFFECT MEASUREMENTS USING A SCANNING TECHNIQUE AND PULSED FIELDS.
Technical rept.,
by I. Maartense. Oct 66, 16p TR-5
Contract Nonr-3013 (00)
Proj. NR-018-503

Descriptors: (*Line spectrum, *Magnetic fields), Solids, Absorption spectrum, Cryogenics, Electron transitions, Optical scanning, Instrumentation, Europium compounds, Tungstates.

Identifiers: Europium tungstate, Zeeman effect.

A method is described for obtaining optical spectra of solids subjected to short duration pulsed magnetic fields of the order of 300 kilo-oersteds. A spectral region is scanned repetitively every 28 microsec by a moving slit and detected photoelectrically, making it possible to measure wavelength and intensity changes of spectral features as a function of magnetic field. Provision is made for cooling the sample to liquid helium temperature. The Zeeman effect of the septuplet-F-0 to quintuplet-D-2 transition of Eu (3+) in europium tungstate is used as a demonstration of the technique. (Author)

AD-641 917 **Field 20L, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Eaton Electronics Research Lab., McGill Univ., Montreal (Quebec).
ABSORPTION SPECTRA OF MnF2 AND CaMnF3.
Technical rept.,
by Richard Stevenson. Oct 66, 15p TR-6
Contract Nonr-3013 (00)
Proj. NR-018-503

Descriptors: (*Manganese compounds, Absorption spectrum), (*Antiferromagnetism, Manganese compounds), Cesium compounds, Fluorides, Cryogenics, Line spectrum, Atomic energy levels, Electron transitions, Selection rules, Nuclear spins, Magnetic properties.

Identifiers: Manganous fluoride, Cesium manganese fluoride.

Absorption spectra in the 3950A region of MnF2 and CsMnF3 at 4.2K are presented. The spectra show transitions from the sextuplet-gamma-1 ground state to the quadruplet-gamma-1 and quadruplet-gamma-3 excited states. Remarkable similarity in the spectra is observed, suggesting that magnetic interactions in both crystals are very similar. The sextuplet-gamma-1 to quandruplet-gamma-3 transitions appear to be the same both in the sigma and the P1 spectra. Fine structure is found on the sextuplet-gamma-1 to quadruplet-gamma-1 transitions. In the P1-spectra the fine structure seems to show a Lande interval pattern, and is interpreted in terms of a K,S1.S2 interaction (S = 3/2) with K = 16.7/cm for MnF2 and 16.8/cm for CsMnF3 in the sigma-spectrum exchange coupling of ion pairs is observed. The pair is excited so that one ion gives into the S = 3/2 state, while the other remains in the S = 5/2 state. The selection rule is that the total spin of the pair is constant. (Author)

AD-641 918 **Field 20L, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Eaton Electronics Research Lab., McGill Univ., Montreal (Quebec).
MAGNON SIDEBANDS IN CsMnF3.
Technical rept.,
by Richard Stevenson. Oct 66, 6p TR-7
Contract Nonr-3013 (00)
Proj. NR-018-503

Descriptors: (*Manganese compounds, Absorption spectrum), (*Antiferromagnetism, Manganese compounds), Band spectrum, Magnetic fields, Line spectrum, Intensity, Nuclear spins.

Identifiers: Cesium manganese fluoride, Magnons.

Magnon sidebands were observed in CsMnF3 in the 5420A region at 4.2K. The lines are similar in shape and intensity to those observed in the optical absorption spectra of MnF2. (Author)

AD-641 958 **Field 20L, 20B**
CFSTI Prices: HC$3.00 MF$0.75
Naval Research Lab., Washington, D. C.
PREPARATION AND CHARACTERIZATION OF ULTRA-PURE SOLIDS.
Annual rept. 1 Jul 65-30 Jun 66,
by C. C. Klick, G. T. Rado, M. R. Achter, and A. I. Schindler. 1966, 98p NRL-MR-1718
ARPA Order-418
See also AD-622 369.

Descriptors: (*Single crystals, Preparation), (*Refractory metals, Purification), (*Magnetic materials, Purification), Metallic crystals, Transition elements, Intermetallic compounds, Alkali metal compounds, Halides, Potassium compounds, Bromides, Crystal growth, Analysis, Niobium, Crystallography, Grain boundaries, Thermal conductivity, Phonons.

Contents: Alkali halide crystals, with emphasis on potassium bromide (Physical methods of purification, Chemical methods of purification, Crystal growth, Characterization and analysis); Refractory metal crystals (Growth and characterization of single crystals of niobium, Crystallography of bicrystals, Sintering of intergranular porosity in bicrystals, Grain boundary energy, Grain boundary self-diffusion in niobium); Transition metal and intermetallic compound single crystals (Properties of liquid metals, Production and purification of Nb single crystals, Low temperature thermal conductivity of hafnium, magnetoacoustic oscillations in single crystal copper); Magnetic materials (Crystal synthesis of A2BF4 and Ga2-xFexO3, Crystal characterization of K2CoF4, K2ZnF4: Co (2+), doped Al2O3, and Fe (3+) doped beta-G-a2O3).

NBS-TN-408 **Field 20L, 11G**
CFSTI Prices: HC$0.45 MF$0.75
General Electric Co., Schenectady, N. Y. Research and Development Center.
SUPERCONDUCTIVE MATERIALS AND SOME OF THEIR PROPERTIES.
Technical note,
by B. W. Roberts. 26 Sep 66, 81p
Also available from Superintendent of Documents, GPO, Washington, D. C.

Descriptors: (*Superconductors, Reviews), Superconductivity, Transition temperature, Crystallography, Cryogenics, Magnetic fields, Tables, Bibliographies.

The report is a noncritical compilation of data on superconductive materials that has been extracted from the literature published between October 1963 and December 1965. The properties concerned are composition, critical temperature, critical field crystallographic data, and lowest temperature tested for superconductivity. The compilation also includes, bibliography, general reference review articles and a special tabulation of high magnetic field superconductors. (Author)

N66-33386 **Field 20L**
CFSTI Prices HC$1.00 MF$0.50
Illinois Univ., Urbana.
ANNEALING OF NEUTRON-IRRADIATION-INDUCED CHANGES IN IMPURITY CONDUCTION IN ANTIMONY- DOPED GERMANIUM.
by W. D. Compton, and E. L. Wolf. 1965, 15p
NASA-CR-77037
Grant NSG-228-62

Descriptors: *Antimony, *Doping, *Germanium, *Neutron emission, Activation, Annealing, Conduction, Energy, Impurity, Induction, Irradiation, Neutron, Resistivity, Temperature.

For abstract, see STAR 04 19.

N66-33436 **Field 20L**
CFSTI Prices HC$1.00 MF$0.50
General Dynamics Corp., San Diego, Calif. Special Nuclear Effects Lab.
RADIATION EFFECTS ON SILICON SIXTH QUARTERLY PROGRESS REPORT, APR. 1 - JUN. 30, 1966.
by H. Horiye, J. A. Naber, and E. G. Wikner. 11 Jul 66, 15p NASA-CR-77053, GACD-6249
Contract NAS7-289

Descriptors: *Radiation effect, *Silicon, *Solar cell, Annealing, Cell, Constant, Damage, Dielectric, Effect, Electron, High purity, Irradiation, Low temperature, N type, Property, Radiation, Resonance, Semiconductor, Solar, Spin.

For abstract, see STAR 04 19.

N66-33676 **Field 20L**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
CONTRIBUTION TO THE THEORY OF THE ADSORPTION EFFECT AT THE SURFACE OF SEMICONDUCTORS AND GELS UNDER THE ACTION OF IONIZING RADIATION.
K Teorii Adsorbtsionnogo Effekta Na Poverkhnostyakh Poluprovodnikov I Geley Pod Deystviyem Ioniziruyushchego Oblucheniya
by SH. A.Ablyayev, D. A. Aronov, U. U. Pulatov, and R. G. Shamasov. May 66, 18p NASA-TT-F-10137
Transl. Into English From Izv. Akad. Nauk Uzbekstoy Ssr, Ser. Fiz.- Mat. Nauk (Tashkend), V. 9, No. 5, 1965 P 63-70

Descriptors: *Adsorption, *Gel, *Ionizing radiation, *Semiconductor, Change, Effect, Electron, Gamma, Hole, Ionizing, Magnitude, Pair, Polarity, Pressure, Radiation, Sign, Temperature, Test.

For abstract, see STAR 04 19.

N66-33682 **Field 20L**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
STUDY OF THE PROPAGATION PROCESS OF A REACTION IN SOLID PHASES.
Izucheniye Protsessa Rasprostraneniya Reaktsii V Tverdykh Fazakh
by P. I. Belkevich, and YE. S.Osinovik. Jun 66, 26p NASA-TT-F-10226
Transl. Into English From Izv. Akad. Nauk Belorussk Ssr (Moscow), No. 5, 1955 P 149-160

Descriptors: *Chemical kinetics, *Electric conductivity, *Oxalate, *Reaction time, *Silver compound, *Solid phase, *Thermal dissociation, Chemical, Compound, Conductivity, Dissociation, Electric, Kinetics, Phase, Propagation, Rate, Reaction, Salt, Silver, Solid, Thermal, Time.

For abstract, see STAR 04 19.

N66-33683 **Field 20L**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration, Washington, D. C.
ORGANIC SEMICONDUCTORS.
Organische Halbleiter
by C. Hamann. Aug 66, 75p NASA-TT-F-10227

Transl. Into English From Physica Status Solidi (East Germany), V. 12, 1965 P 483-532

Descriptors: *Electric property, *Organic compound, *Semiconductor, *Solid state, Application, Charge, Compound, Electric, Material, Measurement, Method, Organic, Preparation, Property, Solid, State, Technique, Theory, Transport.

For abstract, see STAR 04 19.

N66-33685 Field 20L
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
INFRARED QUENCHING OF THE PHOTOVOLTAIC EFFECT IN CADMIUM SULFIDE.
Infrachervone Gasinnya Fotovol'taychnogo Efektu V Sul'fidi Kadimuyu
by V. O. Drozdov, SH. D.Kurmanshev, and O. L. Rvachov. Aug 66, 13p NASA-TT-F-10259
Transl. Into English From Ukr. Fiz. Zh. (Kiev), V. 11, No. 1, 1966 P 45-48

Descriptors: *Cadmium sulfide, *Infrared radiation, *Photovoltaic effect, *Polycrystal, *Radiation effect, *Single crystal, Cadmium, Crystal, Effect, Infrared, Light, Photoconductivity, Photovoltaic, Quenching, Radiation, Single, Stimulation, Sulfide, Visible.

For abstract, see STAR 04 19.

N66-33705 Field 20L
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
EFFECT OF CRYSTALLINE STRUCTURE ON THE PHOTOELECTRIC PROPERTIES OF THIN LAYERS OF CADMIUM SULFIDE.
Vliyaniye Kristallicheskoy Struktury Na Fotoelektricheskiye Svoystva Tonkikh Sloyev Sul'fida Kadmiya
by I. A. Karetnikov, L. P. Pavlov, and K. V. Shalimova. Aug 66, 14p NASA-TT-F-10260
Transl. Into English From Izv. Vysshikh Uchebn. Zavedenii, Fiz. (Tomsk), V. 9, No. 1, 1966 P 132-136

Descriptors: *Cadmium sulfide, *Crystal structure, *Photoelectricity, Annealing, Cadmium, Composition, Crystal, Electric, Electronography, Layer, Optical, Phase, Photocurrent, Photosensitivity, Polycrystal, Preparation, Property, Spectrum, Structure, Substrate, Sulfide, Temperature, Thin, X-ray.

For abstract, see STAR 04 19.

N66-34068 Field 20L
CFSTI Prices HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. Of Physics.
AN EXPERIMENTAL INVESTIGATION OF RADIATION EFFECTS IN SEMICONDUCTORS SEMIANNUAL STATUS REPORT, 1 JAN. - 30 JUN. 1966.
by W. D. Compton. 1966, 20p NASA-CR-77106
Grant NSG-228-62

Descriptors: *Luminescence, *Radiation effect, *Semiconductor, *Tunneling, Antimony, Band, Cobalt 60, Concentration, Effect, Emission, Germanium, Impurity, Junction, N type, P type, Radiation, Recombination, Stability, Superconductor, Temperature, Thermal.

For abstract, see STAR 04 19.

PB-173 400 Field 20L, 18H, 20H
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
REALISATION D'UN APPAREIL POUR DES MESURES D'ORIENTATION NUCLEAIRE A BASSE TEMPERATURE. APPLICATION A L'ALLIAGE NEODYME-COBALT (Construction of an Apparatus for Nuclear Orientation Measurements at low Temperatures. Application to Neodymium-Cobalt Alloy).
Doctoral thesis in French,
by Eric Mayer. Oct 65, 69p CEA-R-2987
Text in French; Attached summary in English.

Descriptors: (*Gamma emission, Anisotropy), (*Cobalt alloys, Gamma emission), (*Ferromagnetic materials, Gamma emission), Nuclear spins, Polarization, Nickel alloys, Neodymium alloys, Magnetic fields, Low-temperature research, France.

Studies were made on the anisotropy of gamma radiations emitted by oriented nuclei. Use was made of the large hyperfine fields acting on nuclei in ferromagnetic metals so as to produce alignment at low temperature. By irradiation a few cobalt 60 nuclei were obtained in the samples which were then cooled down to 0.01K. The anisotropic rate of the 1.33 MeV gamma radiation was measured in function of the sample temperature, using as thermometer the anisotropy of gamma radiation emitted by cobalt 60 nuclei in a cobalt single crystal. Cobalt 60 was lined up in a cobalt nickel alloy (40% Ni). The hyperfine field at the cobalt was measured compared to the effective field in metallic cobalt: Heff Co Ni/Heff Co metal = 0.71 plus or minus 0.12. Cobalt 60 was polarised in a neodymium-cobalt alloy (NdCo5). The field at the cobalt in NdCo5 was measured compared to the field in metallic cobalt and taking the non-saturation into account it was found: 165 000 oersteds < Heff NdCo5 < 220 000 oersteds. (Author)

AD-457 119 See Field 20E

AD-641 339 See Field 5A

AD-641 390 See Field 20B

AD-641 405 See Field 5A

AD-641 456 See Field 9A

AD-641 483 See Field 20B

AD-641 564 See Field 5B

AD-641 614 See Field 9A

AD-641 631 See Field 20C

AD-641 635 See Field 20C

AD-641 637 See Field 20C

AD-641 638 See Field 20C

AD-641 678 See Field 20J

AD-641 760 See Field 20B

AD-641 773 See Field 20C

AD-641 774 See Field 20C

AD-641 775 See Field 20C

AD-641 776 See Field 20C

AD-641 777 See Field 20C

AD-641 778 See Field 20C

AD-641 782 See Field 20C

AD-641 783 See Field 20C

AD-641 785 See Field 11F

AD-641 786 See Field 11F

AD-641 789 See Field 20C

AD-641 791 See Field 7D

AD-641 793 See Field 20C

AD-641 796 See Field 20C

AD-641 803 See Field 20C

AD-641 811 See Field 7E

AD-641 812 See Field 20C

AD-641 851 See Field 5A

AD-641 992 See Field 20C

NBS-TN-293 See Field 20B

20M. THERMODYNAMICS

AD-454 992 Field 20M
CFSTI Price: HC$16.40
General Electric Co., Philadelphia, Pa. Missile and Space Div.
STUDY OF RADIATION HEAT FLUX FROM HIGH PRESSURE AIR ARCS.
Technical rept. Dec 63-Nov 64,
by C. H. Marston. Jan 65, 168p
Contract AF 40 (600)-1080
Proj. AF-8952
Task 895202
AEDC-TR-65-11

Descriptors: (*Test facilities, Reentry vehicles), (*Thermal radiation, Test facilities), (*Electric arcs, Thermal radiation), Models (Simulations), Shock tubes, Pressure, Measurement, Digital computers, Programming (Computers), Temperature, Heat transfer, Cylindrical bodies, Absorption, Emissivity.

A computational model was developed and applied for calculating radiant heat flux from an electric arc using real gas properties and taking into account both self absorption and space varying temperature. The model requires knowledge of the temperature profile as an input. Temperature profiles were measured spectrographically using an air arc at one and 2.4 atmospheres. These measured profiles plus some simple analytic ones which satisfied boundary conditions were used to calculate radiant heat flux at pressures from 1 to 300 atmospheres. The experimental program also included measurements of radiant flux density at 2.2 and 5.7 atmospheres for comparison with calculations based on the measured profiles. Estimates were made of radiation losses in the aedc 20-megawatt arc air heater now under development. (Author)

AD-457 861 Field 20M
CFSTI Price: HC$3.00
Auburn Univ., Ala. Dept. of Mechanical Engineering.
HEAT TRANSFER THROUGH A HOLLOW CYLINDER SUBJECTED TO TEMPERATURE SHOCK,
by G. E. Tanger, and R. G. Hofer. 20 Jan 61, 85p
Rept. no. 3
Contract DA-191-009-506-ORD-812

Descriptors: (*Cylindrical bodies, *Heat transfer), Thermal stresses, Difference equations, Numerical analysis, Programming (Computers), Digital computers.

Identifiers: Thermal shock.

Finite difference equations are employed to solve the problem of transient heat transfer through a plane wall and through a hollow cylinder. The plane wall is exposed to a temperature shock at both surfaces, while the hollow cylinder is exposed to a temperature shock only at the exterior surface. Any initial temperature distribution may be assumed for the plane wall. The cylinder, however, is assumed to be at a constant temperature initially, various boundary conditions at the exterior and

interior surfaces are considered for the hollow cylinder. Digital computer programs are developed for the finite difference equations so that numerical answers may be obtained. (Author)

AD-641 420 **Field 20M**
Not available from CFSTI.
Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
SOLID CARBON-DIOXIDE SUBLIMATION AT AN AXISYMMETRIC STAGNATION POINT.
Revised ed.,
by B. B. Spalding, and F. A. Christie. 30 Nov 64, 4p
Revision of manuscript submitted 3 Aug 64.
Availability: Published in Int. J. Mass Transfer v8 p511-4 1965.

Descriptors: (*Carbon dioxide, *Sublimation), Stagnation point, Solidified gases, Heat transfer, Mass transfer, Thermal conductivity, Great Britain.

The sublimation rate of solid carbon-dioxide was measured at an axisymmetric stagnation point in a stream of hot air. The results, are presented as dimensionless conductances covering a driving-force range of 0.220 < or = 0.835. (Author)

AD-641 632 **Field 20M**
Not available from CFSTI.
Belfer Graduate School of Science, Yeshiva Univ., New York.
RIGOROUS TREATMENT OF THE VAN DER WAALS-MAXWELL THEORY OF THE LIQUID-VAPOR TRANSITION,
by Joel L. Lebowitz, and Oliver Penrose. 4 Mar 65, 19p
Grant AF-AFOSR-508-64
Proj. AF-9767
Task 976701
AFOSR-66-1775
Availability: Published in Journal of Mathematical Physics v7 n1 p98-113 Jan 1966.

Descriptors: (*Phase studies, *Statistical mechanics), Molecular association, Particles, Equations of state, Thermodynamics, Distribution functions, Melting, Boiling, Liquids, Vapors.

Identifiers: Free energy.

It is shown that for a class of Kac intermolecular potentials, including nonnegative-definite and nonpositive potentials, the thermodynamic free-energy density is given in the van der Waals limit by a (rho, 0+)=CE ((a to the zeroth)(rho)+ 1/2 alpha (rho sq.)); and the equation of state is given by Maxwell's modification of the corresponding van der Waals equation of state.

AD-641 633 **Field 20M**
Not available from CFSTI.
Belfer Graduate School of Science, Yeshiva Univ., New York.
PROPERTIES OF LATTICE AND CONTINUUM VAN DER WAALS FLUIDS AT THE CRITICAL POINT,
by Joel L. Lebowitz, Shalom Baer, and G. Steel. 20 Aug 65, 4p
Contract AT (30-1)-1480, Grant AF-AFOSR-508-64
Proj. AF-9767
Task 976701
AFOSR-66-1260
Availability: Published in The Physical Review v141 n1 p198-9 Jan 1966.

Descriptors: (*Molecular association, Thermodynamics), (*Statistical mechanics, Molecular association), Crystal lattices, Gases, Liquids, Specific heat, Particles, Density, Continuum mechanics.

A suggestion by Fisher that the specific heats of lattice gases and continuum fluids near the critical point be compared on the basis of specific heat measured in units of the volume per particle at close packing is examined for systems with hard cores and long-range attractive potentials (van der Waals systems). It is found that the discontinuity at the critical point in the specific heat so defined is indeed similar for lattice gases and continuum systems in one, two, and three dimensions, while the critical density varies widely. No explanation is offered. Numerical values of other critical constants are also given. (Author)

AD-641 954 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
EFFECT OF VOLUMETRIC ABSORPTION COEFFICIENT ON ROSSELAND RADIATIVE HEAT TRANSFER,
by R. L. Spicer. Nov 66, 14p P-3061-1

Descriptors: (*Heat transfer, Absorption), Fluids, Approximation (Mathematics), Fluid flow, Thermal radiation, Optical properties, Walls.

In calculating the temperature profile and heat transfer associated with an optically dense fluid it has been the practice to use Rosseland's approximation for the radiative heat flux, since its form lends itself well for use in partial differential equations. However, very little is known about the form of the absorption coefficient which is the fluid-characteristic term in the approximation. It is revealed in the analysis that in the case of uniform fluid (optically dense) flow past a flat plate, the calculated temperature profiles and heat transfer to the wall by radiation alone are sensitive to the choice of the form of the absorption coefficient. (Author)

N66-32715 **Field 20M**
CFSTI Prices HC$2.50 MF$0.75
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
EXPERIMENTAL TRANSIENT THREE-DIMENSIONAL HEAT TRANSFER ANALYSIS.
by R. W. Blanton Jr, and J. W. Littles. May 65, 68p NASA-CR-67510, R-145
Contract NAS8-5289

Descriptors: *Heat flux, *Three-dimensional motion, *Time function, Aluminum, Analysis, Calorimeter, Computer, Dimension, Energy, Flux, Function, Heat, Heat transfer, Infrared, Lamp, Mathematics, Model, Motion, Program, Source, Temperature, Thermocouple, Thermophysical, Three, Time, Variance, Verification.

For abstract, see STAR 04 19.

N66-32717 **Field 20M**
CFSTI Prices HC$3.00 MF$0.75
Lockheed Missiles And Space Co., Sunnyvale, Calif.
STUDY OF HEAT SHIELDING REQUIREMENTS FOR MANNED MARS LANDING AND RETURN MISSIONS FINAL REPORT.
by W. D. Coleman, L. F. Hearne, and L. W. Woodruff. Sep 65, 115p NASA-CR-68147
Contract NAS2-1798
Its Rept.-4-74-65-1

Descriptors: *Heat shield, *Hyperbolic reentry, *Material testing, *Planetary landing, Atmosphere, Blunt, Body, Earth, Heat, Hyperbola, Landing, Lift, Material, Overshoot, Planetary, Reentry, Shield, Slender, Speed, Testing, Vehicle.

For abstract, see STAR 04 19.

N66-32723 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
Dynatech Corp., Cambridge, Mass.
THERMOPHYSICAL PROPERTIES MEASUREMENTS PERFORMED FOR NASA.
by H. L. Traiger, and R. L. Wentworth. 27 Aug 64, 21p NASA-CR-60042
NASA ORDER L-48876
Its Rept.-493

Descriptors: *Density measurement, *Specific heat, *Thermoconductivity, *Thermophysical property, Curve, Density, Heat, Material, Measurement, Plastic, Property, Slope, Specific, Temperature, Testing, Thermophysical.

For abstract, see STAR 04 19.

N66-32762 **Field 20M**
CFSTI Prices HC$2.00 MF$0.50
Southern Methodist Univ., Dallas, Tex.
HEAT TRANSFER ACROSS SURFACES IN CONTACT - PRACTICAL EFFECTS OF TRANSIENT TEMPERATURE AND PRESSURE ENVIRONMENTS SEMIANNUAL REPORT, 1 OCT. 1965 - 1 APR. 1966.
by H. A. Blum, and C. J. Moore Jr. 1966, 40p
NASA-CR-76878
Grant NSG-711

Descriptors: *Heat transfer, *Metal surface, *Pressure effect, *Transient heating, Aluminum, Effect, Environment, Experiment, Heat, Metal, Pressure, Stainless, Steel, Study, Surface, Temperature, Theory, Transfer, Transient.

For abstract, see STAR 04 19.

N66-32786 **Field 20M**
CFSTI Prices HC$2.50 MF$0.75
Stanford Univ., Calif. Dept. Of Aeronautics And Astronautics.
DYNAMIC STABILITY OF A UNIFORM FREE-FREE BEAM UNDER A GIMBALED THRUST OF PERIODICALLY VARYING MAGNITUDE.
by T. R. Beale. Jun 63, 87p NASA-CR-76925, SUDAER-161
Grant NSG-133-61

Descriptors: *Bending vibration, *Dynamic stability, *Rocket vehicle, *Structural beam, *Thrust loading, Beam, Bending, Dynamic, Instability, Loading, Mathematics, Model, Oscillation, Rocket, Stability, Structural, Thrust, Vehicle, Vibration.

For abstract, see STAR 04 19.

N66-32804 **Field 20M**
CFSTI Prices HC$2.50 MF$0.75
Illinois Univ., Urbana. Engineering Experiment Station.
AN EXPERIMENTAL AND THEORETICAL INVESTIGATION OF THE THERMAL CONTACT RESISTANCE FINAL REPORT.
by A. M. Clausing. Jul 66, 81p NASA-CR-76867, ME-TN-242-3
Grant NSG-242-62

Descriptors: *Contact resistance, *Mathematical model, *Thermal effect, *Vacuum, Analysis, Contact, Effect, Elastic, Environment, Film, Macroscopy, Mathematics, Mating, Microscopy, Model, Resistance, Restriction, Thermal.

For abstract, see STAR 04 19.

N66-32946 **Field 20M**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration, Washington, D. C.
PROCEEDINGS OF CONFERENCE ON ACTIVE TEMPERATURE CONTROL.
by C. P. Mook. 1964, 92p NASA-TM-X-56165
Conf. Held At Nasa Headquarters, 9 Apr. 1964

Descriptors: *Conference, *Spacecraft environment, *Temperature control, *Thermal radiation, Capillary, Control, Convection.

Electronic, Equipment, Forced, Heat, Louver, Lunar, Mariner program, Micrometeoroid, Pump, Radiation, Shield, Surface, System, Temperature, Thermal.

For abstract, see STAR 04 19.

N66-33180 **Field 20M**
CFSTI Prices HC$3.00 MF$0.75
Michigan Univ., Ann Arbor. Heat Transfer And Thermodynamics Lab.
PRESSURIZATION OF LIQUID OXYGEN CONTAINERS PROGRESS REPORT NO. 7, NOV. 1963 - NOV. 1964.
by B. Bailey, H. Barakat, J. A. Clark, E. Lewis, and H. Merte Jr. Jan 65, 81p NASA-CR-63431
Contract NAS8-825
Its Rept.-04268-9-p

Descriptors: *Boiling, *Cryogenic fluid, *Liquid oxygen (lox), *Pressure vessel, Bubble, Container, Convection, Cooling, Cryogenic, Dimensional, Fluid, Free, Heat, High gravity, Hydrogen, Injection, Laminar, Liquid, Low gravity, Nitrogen, Oxygen, Pressurization, Transfer, Two.

For abstract, see STAR 04 19.

N66-33184 **Field 20M**
CFSTI Prices HC$3.00 MF$0.75
Maryland Univ., College Park. Inst. For Molecular Physics.
HEAT CONDUCTIVITY OF POLYATOMIC AND POLAR GASES AND GAS MIXTURES.
by E. A. Mason, L. Monchick, and A. N. Pereira. 15 Dec 64, 60p NASA-CR-59973, IMP-NASA-45
Grant NSG-5-59
Submitted For Publication

Descriptors: *Gas mixture, *Heat transfer, *Polar gas, *Polyatomic gas, Calculation, Conduction, Conductivity, Gas, Heat, Mixture, Polar, Polyatomic, Theory.

For abstract, see STAR 04 19.

N66-33307 **Field 20M**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
PRELIMINARY EVALUATION OF A NUMBER OF ABLATIVE HEAT-SHIELD MATERIALS EXPOSED TO COMBINED RADIATIVE AND CONVECTIVE HEATING.
by R. R. Dickey, and J. F. Haacker. Mar 63, 72p NASA-TM-X-784

Descriptors: *Ablating material, *Convective heat transfer, *Heat shield, *Radiative heat transfer, *Reentry vehicle, Ablation, Balsa, Convection, Cork, Flux, Heat, Heat transfer, Manned, Material, Point, Radiative, Reentry, Shield, Spacecraft, Stagnation, Vehicle, Wood.

For abstract, see STAR 04 19.

N66-33308 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
NOTE ON A CORRELATION OF BOUNDARY-LAYER TRANSITION RESULTS ON HIGHLY COOLED BLUNT BODIES.
by R. J. Wisniewski. 80 Dec 58, 24p NASA-MEMO-10-8-58E

Descriptors: *Blunt body, *Boundary layer transition, *Hypersonic flow, *Laminar flow, *Turbulent flow, Ballistics, Boundary, Cool, Flow, Hypersonic, Laminar, Layer, Missile, Reentry, Roughness, Surface, Transition, Turbulent, Vehicle.

For abstract, see STAR 04 19.

N66-33322 **Field 20M**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
CONVECTIVE HEAT TRANSFER TO A LIFTING FLAT-FACED-CONE ENTRY BODY.
by J. E. Terry. May 61, 45p NASA-TM-X-509

Descriptors: *Blunt body, *Cone, *Convective heat transfer, *Lifting body, *Pressure distribution, Blunt, Body, Convection, Distribution, Drag, Flat, Flow, Heat transfer, Heating, Lift, Lifting, Point, Pressure, Stagnation.

For abstract, see STAR 04 19.

N66-33334 **Field 20M**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
HEAT-TRANSFER AND PRESSURE DISTRIBUTIONS ON A FLAT-FACE ROUNDED-CORNER BODY OF REVOLUTION WITH AND WITHOUT A FLAP AT A MACH NUMBER OF 8.
by R. A. Jones. Sep 62, 59p NASA-TM-X-703

Descriptors: *Body of revolution, *Flap control, *Flat surface, *Heat transfer, *Hypersonic speed, *Pressure distribution, *Zero angle of attack, Afterbody, Angle of attack, Body, Control, Corner, Distribution, Enthalpy, Face, Flap, Flat, Gas, Point, Pressure, Real, Reentry, Revolution, Reynolds number, Round, Stagnation, Surface, Vehicle, Zero.

For abstract, see STAR 04 19.

N66-33335 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
INVESTIGATION OF LITHIUM HYDRIDE AND MAGNESIUM AS HIGH-TEMPERATURE INTERNAL COOLANTS WITH SEVERAL SKIN MATERIALS.
by J. L. Modisette. 28 May 58, 20p NACA-RM-L58B17

Descriptors: *Coolant, *Heat transfer, *Lithium hydride, *Magnesium, *Skin temperature, Aluminum, Coating, Decomposition, Hemisphere, Hydride, Internal, Lithium, Material, Model, Nose, Oxide, Paraffin, Protection, Shape, Skin, Stagnation, Stainless, Steel, Temperature, Testing, Titanium.

For abstract, see STAR 04 19.

N66-33378 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
DEVELOPMENT OF THERMAL CONTROL COATINGS FOR SPACE VEHICLES.
by C. P. Mook. 1964, 7p NASA-TM-X-54906
Presented At The Govt. Paint Symp., Ann. Meeting Of The Natl. Paint, Varnish And Lacquer Assoc., Dallas, 11 Nov. 1964

Descriptors: *Protective coating, *Space vehicle, *Thermal protection, Carbon, Coating, Control, Development, Dioxide, Epoxy, Oxide, Paint, Pigment, Protection, Silicone, Space, Thermal, Titanium, Vehicle, White, Zinc.

For abstract, see STAR 04 19.

N66-33408 **Field 20M**
CFSTI Prices HC$4.00 MF$0.75
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile And Space Systems Div.
THERMAL CONTACT CONDUCTANCE IN A VACUUM ENVIRONMENT.
by M. F. Bloom. 13 Dec 64, 111p NASA-CR-75148, SM-47700
Contract NAS7-101

Descriptors: *Aluminum, *Contact resistance, *Stainless steel, *Thermoconductivity, *Vacuum chamber, Analysis, Chamber, Conductance, Contact, Data, Electric, Environment, High temperature, Resistance, Stainless, Steel, Testing, Thermal, Vacuum.

For abstract, see STAR 04 19.

N66-33423 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
THE VAPOR PRESSURE OF MAGNESIUM BETWEEN 223 DEG AND 385 DEG C.
by W. P. Gilbreathe. 1964, 14p NASA-TM-X-54897
Submitted For Publication

Descriptors: *Evaporation rate, *Langmuir probe, *Magnesium, *Vapor pressure, Change, Evaporation, Experiment, Function, Pressure, Rate, Solid, Technique, Temperature, Vacuum, Vapor, Weight.

For abstract, see STAR 04 19.

N66-33677 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
VAPOR PRESSURE IN SOLID YTTRIUM.
Tisk Pari Tverdogo Itryyu
by A. A. Kruglykh, V. S. Pavlov, and G. P. Tikhynskiy. Jul 66, 9p NASA-TT-F-10210
Transl. Into English From Ukr. Fiz. Zh. (Kiev), V. 9, No. 2, 1964 P 214-215

Descriptors: *Solid phase, *Vapor pressure, *Yttrium, Earth, Evaporation, Phase, Pressure, Rare, Saturation, Solid, Vapor, Vaporization.

For abstract, see STAR 04 19.

N66-33678 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
INVESTIGATION OF WALL SURFACE TEMPERATURE BEHIND A MOVING SHOCK WAVE.
Issledovaniye Temperatury Poverkhnosti Stenki Za Dvizhushcheysya Udarnoy Volnoy
by N. V. Chereshneva, YU. A. Demyanov, S. S. Kellin, and M. V. Volodina. Jun 66, 11p NASA-TT-F-10219
Transl. Into English From Izv. Akad. Nauk Sssr, Otd. Tekhn. Nauk- Mekhan. I Mashinostr. (Moscow), No. 6, 1960 P 112-116

Descriptors: *Shock wave, *Surface temperature, *Wall temperature, Boundary, Constant, Flat, Flux, Layer, Nonstationary, Plate, Shock, Surface, Temperature, Wall, Wave.

For abstract, see STAR 04 19.

N66-33679 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
DETERMINATION OF THE SATURATED VAPOR PRESSURE OF NIOBIUM DIOXIDE.
Opredeleniye Davleniya Nasyschennogo Para Dvuokisi Niobiya

by K. YE. Frantseva, G. A. Semenov, and S. A. Shchukarev. Jun 66, 11p NASA-TT-F-10220
Transl. Into English From Dokl. Akad. Nauk Sssr (Moscow), V. 145, No. 1, 1962 P 119-121

Descriptors: *Effusion, *Niobium oxide, *Saturation, *Vapor pressure, Differential, Dioxide, Dissociation, Energy, Method, Niobium, Oxide, Pressure, Thermal, Vapor, Variation.

For abstract, see STAR 04 19.

N66-33689 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
FEATURES OF FILM BOILING IN SURFACE WATER COOLING.
Osobennosti Plenochnogo Kipeniya Pri Poverkhnostnom Vodyanom Okhlazhdenii
by A. D. Akimenko. Jun 66, 9p NASA-TT-F-10184
Transl. Into English From Inzh.-fiz. Zh. (Ussr), V. 7, No. 6, 1964 P 32-34

Descriptors: *Heat transfer, *Surface cooling, *Water jet, Boiling, Coefficient, Cooling, Copper, Critical, Discharge, Equilibrium, Film, Forced, Injector, Jet, Load, Steel, Surface, Thermal, Water.

For abstract, see STAR 04 19.

N66-33695 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
DETERMINATION OF THE THERMAL CHARACTERISTICS OF A TWO-DIMENSIONAL LAMINAR BOUNDARY LAYER IN A COMPRESSIBLE GAS WITHOUT A LONGITUDINAL PRESSURE GRADIENT, IN THE VICINITY OF THE FORWARD STAGNATION POINT.
Ob Opredelenii Teplovykh Kharakteristik Dvukhmernogo Laminarnogo Pogranichnogo Sloya V Szhimayemom Gaze Pri Otsutvii Prodol'nogo Gradiyenta Davleniya I V Okrestnosti Peredney Kriticheskoy Tochki
by I. I. Suksov. Jun 66, 21p NASA-TT-F-10217
Transl. Into English From Izv. Vysshikh Uchebn. Zaved., Ser. Aviats. Tekhn. (Kazan), No. 1, 1961 P 27-37

Descriptors: *Friction coefficient, *Heat-transfer coefficient, *Laminar boundary layer, *Stagnation point, Boundary, Characteristics, Coefficient, Compressible, Dimensional, Forward, Friction, Gas, Heat transfer, Laminar, Layer, Point, Recovery, Stagnation, Thermal, Thermodynamics, Two.

For abstract, see STAR 04 19.

N66-33702 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
RADIATIVE HEAT TRANSFER NEAR THE STAGNATION POINT OF A BLUNT BODY.
Luchistyy Teploobmen V Okrestnosti Lobovoy Tochki Tupogo Tela
by Z. S. Galanova. May 66, 20p NASA-TT-F-10087
Transl. Into English From Vestn. Leningr. Univ., Ser. Mat., Mekh. I Astron. (Leningrad), No. 1, Issue 1, 1966 P 120-130

Descriptors: *Blunt body, *Hypersonic flow, *Radiative heat transfer, *Stagnation point, Axisymmetry, Blunt, Body, Conductivity, Dimensional, Flow, Flux, Gas, Heat, Heat transfer, Hypersonic, Layer, Parallel, Point, Radiative, Shock, Stagnation, Two, Volume, Wall, Wave.

For abstract, see STAR 04 19.

N66-33767 **Field 20M**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
ENHANCEMENT OF CONVECTIVE HEAT TRANSFER IN CHANNELS BY MEANS OF ARTIFICIAL FLOW TURBULENCE.
Ob Intensifikatsii Konvektivnogo Teploobmena V Kanalakh Putem Primeneniya Iskusstvennoy Turbulizatsii Potoka
by V. K. Migai. Aug 66, 26p NASA-TT-F-10257
Transl. Into English From Izv. Akad. Nauk Sssr, Energ. I Transport (Moscow), No. 6, 1966 P 123-131

Descriptors: *Channel flow, *Convective heat transfer, *Turbulent flow, Artificial, Channel, Convection, Enhancement, Exchange, Flow, Fluid, Heat, Layer, Roughness, Transfer, Turbulent, Two, Viscosity.

For abstract, see STAR 04 19.

N66-33969 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
INSTRUMENT SYSTEM FOR DETERMINING TEMPERATURE EFFECTS ON MAXIMUN INDUCTION OF MAGNETIC MATERIALS.
by A. C. Hoffman. Aug 66, 16p NASA-TN-D-3568
Contract 120-27-04-18-22

Descriptors: *Electric measurement, *Induction, *Magnetic material, *Temperature effect, Effect, Electric, Electromagnetism, Experiment, Instrument, Magnetic, Material, Maximum, Measurement, System, Temperature.

For abstract, see STAR 04 19.

N66-33982 **Field 20M**
CFSTI Prices HC$2.00 MF$0.50
Celestial Research Corp., South Pasadena, Calif.
EXPERIMENTAL INVESTIGATIONS OF SOLID NITROGEN FORMED BY CRYOPUMPING.
by K. W. Rogers. Aug 66, 47p NASA-CR-553
Contract NASW-1282

Descriptors: *Cryopumping, *Density measurement, *Solid nitrogen, *Thermoconductivity, Coefficient, Condensation, Density, Deposition, Formation, Gas, Measurement, Nitrogen, Pressure, Rate, Solid, Sticking, Temperature, Thickness.

For abstract, see STAR 04 19.

N66-34073 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
Case Inst. Of Tech., Cleveland, Ohio.
ON SOLUTION STRUCTURE OF THE RADIAL HEAT PROBLEM WITH SINGULAR DATA.
by L. R. Bragg. Aug 66, 25p NASA-CR-77082
Grant NSG-544

Descriptors: *Initial value problem, *Laplace operator, *Radial distribution, *Singularity (math), Distribution, Heat, Initial, Laplace transform, Logarithm, Mathematics, Pole, Radial, Singularity, Value.

For abstract, see STAR 04 19.

N66-37806 **Field 20M**
CFSTI Prices HC$4.00 MF$1.00
National Aeronautics And Space Administration, Washington, D. C.
PROCEEDINGS OF CONFERENCE ON THERMAL JOINT CONDUCTANCE.
1964, 134p NASA-TM-X-56300
Conf. Held At Nasa Headquarters, Washington, D. C., 19 Feb. 1964

Descriptors: *Conference, *Convective heat transfer, *Measuring apparatus, *Metal joint, *Surface pressure, *Thermal conductor, Aluminum, Conductance, Copper, Dynamics, Interface, Magnesium, Molybdenum, Stainless steel, Steel, Value.

For abstract, see STAR 04 23.

N66-37814 **Field 20M**
CFSTI Prices HC$5.00 MF$1.25
National Aeronautics And Space Administration, Washington, D. C.
PROCEEDINGS OF CONFERENCE ON SPACECRAFT COATINGS DEVELOPMENT.
1964, 194p NASA-TM-X-56167
Conf. Held At Nasa Headquarters, Washington, D. C., 6 May 1964

Descriptors: *Absorption, *Coating, *Conference, *Optical property, *Spacecraft design, *Temperature control, *Thermal emission, Effect, Environment, Gamma, Infrared, Instrumentation, Radiation, Space, Spectral, Stability, Temperature, Ultraviolet.

For abstract, see STAR 04 23.

N66-38105 **Field 20M**
CFSTI Prices HC$4.00 MF$1.00
General Dynamics/convair, San Diego, Calif.
STUDY ON EXHAUST PLUME RADIATION PREDICTIONS INTERIM TECHNICAL PROGRESS REPORT, 1 JUN. 1964 - 30 NOV. 1965.
Jan 66, 132p NASA-CR-78429, GD/C-DBE-66-001
Contract NAS8-11363

Descriptors: *Base heating, *Exhaust gas, *Launch vehicle, *Radiation emission, Absorption, Burner, Emissivity, Flame, Hot, Measurement, Prediction, Rocket engine, Saturn v launch vehicle, Spectral, Vapor, Water.

For abstract, see STAR 04 23.

N66-38114 **Field 20M**
CFSTI Prices HC$2.00 MF$0.50
General Dynamics/convair, Huntsville, Ala.
PREDICTION OF TOTAL EMISSIVITY OF NITROGEN- BROADENED AND SELF-BROADENED HOT WATER VAPOR.
by C. C. Ferriso, and C. B. Ludwig. Feb 66, 54p NASA-CR-78430, GD/C-DBE-66-003
Contract NAS8-11363

Descriptors: *Emission, *Nitrogen, *Water vapor, Absorption, Band, Broadening, Coefficient, Depth, Hot, Model, Optical, Prediction, Pressure, Spectral, Statistical, Temperature, Total.

For abstract, see STAR 04 23.

N66-38143 **Field 20M**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
BUOYANCY EFFECTS ON CRITICAL HEAT FLUX OF FORCED CONVECTIVE BOILING IN VERTICAL FLOW.
by D. D. Brown, S. S. Papell, and R. J. Simoneau. Oct 66, 19p NASA-TN-D-3672
Contract 129-01-09-04-22

Descriptors: *Buoyancy, *Convective heat transfer, *Heat flux, *Liquid nitrogen, *Reversed flow, Boiling, Convection, Critical, Effect, Flow, Flux, Forced, Heat, Heat transfer, Liquid, Measurement, Nitrogen, Phase, Reverse, Tube, Vapor, Vertical.

For abstract, see STAR 04 23.

N66-38144 Field 20M
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
LIQUID-HYDROGEN DENSITY MEASUREMENTS USING AN OPEN-ENDED MICROWAVE CAVITY.
by J. Smetana, and N. C. Wenger. Oct 66, 17p NASA-TN-D-3680
Contract 128-31-06-77-22

Descriptors: *Density measurement, *Liquid hydrogen, *Microwave apparatus, Cavity, Constant, Curve, Density, Design, Dielectric, End, Experiment, Hydrogen, Liquid, Measurement, Microwave, Open, Phase, Static, Two.

For abstract, see STAR 04 23.

N66-38145 Field 20M
CFSTI Prices HC$3.00 MF$1.00
Avco-everett Research Lab., Everett, Mass.
EVALUATION OF HIGH-TEMPERATURE GAS TRANSPORT PROPERTIES FINAL SUMMARY REPORT.
Sep 66, 134p NASA-CR-575
Contract NASW-1188

Descriptors: *Gas transport, *High temperature gas, *Nitrogen, *Plasma arc, *Thermoconductivity, Calculation, Discrepancy, Energy, Hydrogen, Measurement, Property, Radiation, Transfer, Ultraviolet.

For abstract, see STAR 04 23.

N66-38406 Field 20M
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
PROJECT FIRE PHOTOGRAPHIC SUMMARY AND RECORD OF REENTRY PHENOMENA AT HYPERBOLIC VELOCITIES.
by C. W. Mc kee. Oct 66, 70p NASA-TN-D-3571
Film Supplement Number L-893 To This Report Is Available On Loan From Langley Res. Center

Descriptors: *Fire project, *Hyperbolic reentry, *Reentry vehicle, Blunt, Body, Environment, Heating, Photograph, Physics, Reentry, Velocity.

For abstract, see STAR 04 23.

N66-38410 Field 20M
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
PROJECT FIRE INSTRUMENTATION FOR RADIATIVE HEATING AND RELATED MEASUREMENTS.
by N. R. Richardson. Oct 66, 75p NASA-TN-D-3646

Descriptors: *Fire project, *Instrumentation, *Radiative heat transfer, Calibration, Calorimeter, Flight, Measurement, Nasa program, Performance, Plan, Radiometer, Reentry, Shield, System, Thermocouple, Tracking, Velocity.

For abstract, see STAR 04 23.

N66-38422 Field 20M
CFSTI Prices HC$1.00 MF$0.50
State Univ. Of Iowa, Iowa City. Dept. Of Mechanics And Hydraulics.
AN EXTENSION OF PLANE STRAIN ANALYSIS.
by K. Rim, and R. O. Stafford. Oct 66, 19p NASA-CR-621
Grant NSG-576

Descriptors: *Elasticity, *Strain, *Stress analysis, Axial, Elastic, Equation, Isotropic, Linear, Material, Plane, Propellant, Rocket engine, Solid, Thermoelasticity.

For abstract, see STAR 04 23.

N66-38728 Field 20M
CFSTI Prices HC$3.00 MF$0.75
Army Missile Command, Huntsville, Ala. Research Branch.
TRANSPIRATION AND FILM COOLING OF LIQUID ROCKET NOZZLES.
by G. J. Caras, and J. E. Terry. 31 Mar 66, 86p NASA-CR-78541, RSIC-535
Sponsored In Part By Nasa

Descriptors: *Film cooling, *Rocket nozzle, *Transpiration cooling, Analysis, Cooling, Film, Liquid, Mathematics, Nozzle, Rocket, Transpiration.

For abstract, see STAR 04 23.

N66-38790 Field 20M
CFSTI Prices HC$3.00 MF$0.75
General Dynamics/convair, San Diego, Calif.
STUDY OF EXHAUST PLUME RADIATION PREDICTIONS, PART II INTERIM PROGRESS REPORT.
Feb 66, 74p NASA-CR-78595, GD/C-DBE-66-001A, PT. II
Contract NAS8-11363

Descriptors: *Detection, *Infrared radiation, *Jet plume, Carbon dioxide, Carbon monoxide, Exhaust, Heat transfer, Intensity, Line, Long, Missile, Model, Plume, Radiance, Range, Spectrum, Water.

For abstract, see STAR 04 23.

N66-38801 Field 20M
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
THEORETICAL INVESTIGATION OF TURBULENT LIQUID-METAL HEAT TRANSFER IN CHANNELS WITH HEAT SOURCES IN THE FLUID.
by R. M. Inman. Oct 66, 59p NASA-TN-D-3692
Contract 129-01-09-07-22

Descriptors: *Channel, *Heat transfer, *Liquid metal, *Parallel plate, *Turbulent flow, Characteristics, Equation, Fluid, Flux, Generation, Heat, Internal, Temperature, Wall.

For abstract, see STAR 04 23.

AD-641 339 **See Field 5A**

AD-641 481 **See Field 18C**

AD-641 842 **See Field 20D**

AD-641 867 **See Field 7D**

AD-641 886 **See Field 20D**

PB-173 399 **See Field 7D**

20N. WAVE PROPAGATION

AD-641 344 Field 20N
CFSTI Prices: HC$1.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN INVESTIGATION OF SOME OF THE EFFECTS OF THE IONOSPHERE ON ELECTROMAGNETIC WAVE PROPOGATION,
by John C. Mester. Jul 51, 20p BRL-760
Proj. TB3-0538C

Descriptors: (*Ionospheric propagation, Electromagnetic waves), Reflection, Signals, Attenuation, Refractive index, Atmosphere, Numerical analysis.

A study is made of the magneto-ionic splitting and reflection of electro-magnetic waves incident obliquely on a stratified ionosphere. Certain simplifying assumptions are applied to the theory. Under these assumptions the opinion is offered that for sufficiently high frequencies the loss of signal strength due to splitting and reflection may be neglected. (Author)

AD-641 504 Field 20N, 20J
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
RELATIVISTIC EFFECT ON THE CLASSICAL DOPPLER SHIFT: AN ANNOTATED BIBLIOGRAPHY,
by Edmund J. Blau. 10 Feb 64, 10p TG-230-B2
Contract NOw-62-0604

Descriptors: (*Bibliographies, *Doppler effect), (*Relativity theory, Doppler effect), Abstracts, Physics.

Identifiers: Doppler shift.

The classical problem of the Doppler shift of radiation transmitted between two bodies moving relative to each other took on a new aspect with the advent of the Space Age in 1957. When measurements are made between the earth and an artificial satellite, the distance between the objects is large enough so that the finite time of propagation of a signal between the two must be taken into account. The classical equations for the Doppler effect must accordingly be modified or generalized to take into account this relativistic effect. While the concept of simultaneity in relation to measurement at a distance was not neglected in earlier papers on relativity, the recent practical importance of the problem has given rise to a number of new papers in which the theoretical and mathematical aspects of the Doppler effect are examined critically in the light of relativity theory. It is these new investigations which form the subject matter of the present bibliography. The references included were obtained from Physics Abstracts and Electrical Engineering Abstracts and the period covered was 1956 through 1963. The abstracts were taken from the abstract journals, as noted, except for that of Article 10, which was written by the compiler.

AD-641 733 Field 20N, 11G
Not available from CFSTI.
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
REFLECTION AND TRANSMISSION OF ELECTROMAGNETIC WAVES BY A MOVING DIELECTRIC MEDIUM,
by C. Yeh. 3 May 65, 7p
Grant AF-AFOSR-496-64
Proj. AF-4751
AFOSR-66-0541
Availability: Published in Journal of Applied Physics v36 n11 p3513-7 Nov 1965.

Descriptors: (*Electromagnetic waves, *Dielectrics), (*Wave transmission, Electromagnetic waves), (*Reflection, Electromagnetic waves), Motion, Velocity.

The reflection and transmission of electromagnetic waves by a moving dielectric medium are investigated theoretically, and the reflection and transmission coefficients are determined. Two cases of the movement are considered: (a) The dielectric medium moves parallel to the interface. (b) The dielectric medium moves perpendicular to the interface. Various features concerning the variation of the reflection and transmission coefficients, angles of reflection and transmission, and the frequencies of the reflected and transmitted wave, as a function of the velocity of the moving medium, are discussed. (Author)

AD-641 734 Field 20N, 11G
Not available from CFSTI.
University of Southern California, Los Angeles. Dept. of Electrical Engineering.

TRANSVERSE MAGNETIC WAVE PROPAGATION IN SINUSOIDALLY STRATIFIED DIELECTRIC MEDIA.
Revised ed.,
by C. Yeh, K. F. Casey, and Z. A. Kaprielian. 30 Dec 64, 8p
Grant AF-AFOSR-496-64
Proj. AF-4751
AFOSR-66-0538
Revision of manuscript submitted 5 Nov 64.
Availability: Published in IEEE Transactions on Microwave Theory and Techniques vMTT13 n3 p297-302 May 1965.

Descriptors: (*Electromagnetic waves, Propagation), (*Dielectrics, Electromagnetic waves), Equations, Stability, Waveguides.

Identifiers: Stratified media.

The problem of the propagation of TM waves in a sinusoidally stratified dielectric medium is considered. The propagation characteristics are determined from the stability diagram of the resultant Hill's equation. Numerical results show that the stability diagrams for Hill's equation and those for Matheiu's equation are quite different. Consequently, the dispersion properties of TM waves and TE waves in this stratified medium are also different. Detailed dispersion characteristics of TM waves in an infinite stratified medium and in waveguides filled longitudinally with this stratified material are obtained. (Author)

AD-641 897 **Field 20N**
CFSTI Prices: HC$2.00 MF$0.50
Boston Univ., Mass.
A NEW METHOD TO MEASURE ELECTRON COLLISION FREQUENCIES IN THE IONOSPHERE BY MEANS OF THE FARADAY ROTATION PROCESS,
by Michael D. Papagiannis. Aug 66, 42p
Scientific-4
Contract AF 19 (628)-2350
Proj. AF-5629
AFCRL-66-618

Descriptors: (*Ionospheric propagation, Transport properties), Measurement, Electrons, Magneto-optic effect, Electron density, Polarization.

A linearly polarized wave propagating in a quasi-longitudinal direction, will become elliptically polarized and show Faraday rotation after passing through an absorbing magnetoionic medium. The theoretical analysis of the problem has yielded a simple expression which relates the collision frequency of the transversed medium to the Faraday rotation and the axial ratio of the received elliptically polarized waves. Thus by means of the derived equations, one can determine the collision frequency by measuring the axial ratio and the Faraday rotation of the transmitted signals. This new method can be used in experiments with sounding rockets to obtain altitude profiles of the collision frequency in the lower ionosphere. It can also be used in satellite to ground experiments to determine the total absorption along the ray path. The applicability of the proposed new method in rocket and satellite experiments is demonstrated in the present report by means of numerical calculations with typical ionospheric profiles and appropriate transmitting frequencies. (Author)

N66-33037 **Field 20N, 9F**
CFSTI Prices HC$1.00 MF$0.50
Council For Scientific And Industrial Research, Johannesburg (South Africa). National Inst. For Telecommunications
RADIO WAVE PROPAGATION AND SATELLITE TRACKING ANNUAL SPECIAL REPORT, 1964-1965.
1965, 25p TEL-53

Descriptors: *Radio telemetry, *Satellite tracking and data acquisition network p, *Space surveillance system, *Telecommunication, *Wave propagation, Acquisition, Astronomy, Data, Distance, Echo, Frequency, Ionosphere, Microwave, Network, Precipitation, Propagation, Radar, Radio, Satellite, Sounding, Space, Station, Surveillance, System, Telemetry, Tracking, Traffic, Wave.

For abstract, see STAR 04 19.

N66-33383 **Field 20N**
CFSTI Prices HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Radiation Lab.
HUYGEN'S PRINCIPLE IN A MOVING ISOTROPIC HOMOGENEOUS AND LINEAR MEDIUM.
by C.-T. Tai. 21 Oct 64, 11p NASA-CR-59629, RL-283
Grant NSG-444
Presented At The 1st Natl. Electron. Conf., Sao Jose Dos Campos, Brazil, 4-9 Jan. 1965

Descriptors: *Electromagnetic field, *Huygen principle, *Isotropic medium, Analysis, Electromagnetism, Energy, Equation, Field, Homogeneity, Isotropic, Linearity, Medium, Motion, Movement, Wave.

For abstract, see STAR 04 19.

N66-33409 **Field 20N**
CFSTI Prices HC$2.00 MF$0.50
Alabama Univ. Research Inst., Huntsville.
APPROXIMATE METHODS FOR THE COMPUTATION OF WAVE PROPAGATION IN NONUNIFORM MEDIA INTERIM REPORT NO. 1.
by H. Y. Yee. 1 Sep 64, 27p NASA-CR-59569
Grant NSG-608

Descriptors: *Approximation method, *Cylinder, *Dielectric constant, *Plane wave, *Wave propagation, Approximation, Computation, Conductance, Constant, Dielectric, Differential, Equation, Field, Method, Nonuniform, Plane, Polarization, Propagation, Scattering, Slab, Wave.

For abstract, see STAR 04 19.

AD-641 705 **See Field 17I**

AD-641 729 **See Field 20F**

N66-33523 **See Field 4A**

PB-173 485 **See Field 14B**

21B. COMBUSTION AND IGNITION

AD-641 503 **Field 21B**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE DETERMINATION OF FLAME SPEED OF PENTABORANE-OXYGEN-NITROGEN MIXTURES,
by H. L. Olsen, E. L. Gayhart, W. G. Berl, E. Maier, and W. T. Renich. Oct 56, 27p CM-888
Contract NOrd-7386

Descriptors: (*Pentaboranes, *Flame propagation), Oxygen, Nitrogen, Velocity, Schlieren photography, Mixtures, Burning rate.

Pentaborane was selected as a representative boron hydride in order to obtain flame speed measurements over a wide range of fuel-air mixtures. Freely-propagating laminar flame kernels produced by spark ignition were photographed by the flash schlieren technique, and the flame speed was derived from the measured rate of growth of these kernels. The pentaborane-air flame velocity peaks slightly on the rich side of stoichiometric. The influence of oxygen concentration on flame speed is reported. Pentaborane flames show pronounced cellular structure of the flame front at all mixture ratios. (Author)

AD-641 602 **Field 21B, 21I**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
SOLID PROPELLANT COMBUSTION: ANALYTICAL SURVEY.
ATD work assignment no. 68.
8 Aug 66, 79p ATD-66-68
TT-66-62551
Based on Soviet open sources pub. 1962-1966. Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Solid rocket propellants, *Combustion), Pressure, Temperature, Particle size, Porosity, Density, Ignition, Fuel additives, Catalysis, Stability, Burning rate, Reviews, Abstracts, USSR.

The survey consists of two parts. Part I contains a general discussion of selected articles on solid propellant combustion and Part II comprises the abstracts of these articles. The information in Part I is divided into 8 sections: (1) The effect of pressure; (2) Particle size, porosity, and density; (3) The effect of temperature; (4) Condensed phase reactions; (5) Ignition characteristics; (6) Additives and catalytic effects; (7) Theoretical stability criteria; (8) Miscellaneous. The material reviewed indicates that Soviet investigators are placing particular emphasis on the following three areas: the relationships between the pressure and the burning velocity; the effect of porosity, particle size, and density on burning velocity and instability; and condensed-phase reactions. These three subjects are discussed somewhat further by the analyst in the Introduction which includes the analyst's evaluation of Soviet combustion research. Part II includes 73 abstracts. (Author)

AD-641 612 **Field 21B, 21H**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
RADIATION FROM ROCKET EXHAUST PLUMES,
by Ralph Zirkind. Aug 66, 35p PIBAL-984

Descriptors: (*Rocket motors, Exhaust gases), (*Exhaust gases, Emissivity), (*Combustion products, Optical properties), Thermochemistry, Rocket propellants, Fluid mechanics, Light, Infrared radiation, Thermal radiation, Reviews.

Identifiers: Rocket exhaust plumes.

An attempt is made to present a unified review and evaluation of the current status concerning the emission of optical radiation from rocket exhaust plumes. This topic has been under intensive investigation for various applications since the 1940's and of recent date centered upon the base heating problem. Thus this subject is of serious concern to the engine as well as the vehicle designer. The emission characteristics of rocket exhaust plumes are strongly dependent upon the aerothermochemistry of the plume. The latter, of course, is related to rocket engine parameters and the specific propellant system employed. Conditions created within the exhaust are different for liquid and solid propellants. Notably, the copious amount of large particles in the efflux of metal based solid propellant motors alter the fluid mechanics and radiative transfer of their exhaust plumes and therefore must be taken into account. (Author)

AD-641 758 **Field 21B, 21E**
CFSTI Prices: HC$1.00 MF$0.50
Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain).
RECENT RESEARCH IN SUPERSONIC COMBUSTION AT INTA,
by Ignacio Da Riva, and Jose Luis Urrutia. 1966. 15p
Grant AF-EOAR-41-66

Proj. AF-9711
Task 971101
AFOSR-66-2479
Presented at the International Astronautical Congress (15th), Madrid (Spain), 9-15 Oct 66.

Descriptors: (*Combustion, *Supersonic flow), (*Ramjet engines, Supersonic flow), Diffusion, Flames, Hydrogen, Air, Oxidizers, Chemical reactions, Reaction kinetics, Spain.

Identifiers: Scramjets.

The paper summarizes the status of recent analytical studies on the fundamental aspects of the diffusional mode of supersonic combustion. Emphasis is on the use of the hydrogen-air (or hydrogen-oxygen-diluent) fuel oxidizer system. Included are discussions of (1) diffusion flames assuming (a) infinite chemical reaction rates and (b) comparable chemical reaction and diffusion rates, (2) premixed flames, and (3) the feasibility of improving aerodynamically the mixing process and diminishing the induction distance. (Author)

AD-641 866 **Field 21B**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
AN EXPRESSION FOR THE BURNING VELOCITY IN SIMULTANEOUS HOMOGENEOUS AND HETEROGENEOUS REACTIONS,
by N. N. Bakhman, and Yu. A. Kondrashkov. 1 Aug 66, 7p ATD-66-98
TT-66-62590
Trans. of Akademiya Nauk SSSR. Doklady, v168 n4 p844-5 1966. Translations of Foreign Scientific and Technical Literature.

Descriptors: (*Combustion, Particles), (*Burning rate, Equations), Additives, Combustion products, Diffusion, Temperature, Pressure, Particle size, USSR.

In the combustion of many systems, apart from the homogeneous reaction, a heterogeneous reaction can also take place on the particles which are either specially introduced into the system (catalytic or energetic additives) or are formed during the combustion process, e.g., soot. Consideration is given to the case when the heterogeneous reaction takes place in a diffusion regime, i.e., when the velocity is limited by the rate at which the reagents are transported to the surface of the particles.

N66-33714 **Field 21B**
CFSTI Prices HC$2.00 MF$0.50
Trw Systems, Redondo Beach, Calif.
CHEMICAL SPECIES AND CHEMICAL REACTIONS OF IMPORTANCE IN NONEQUILIBRIUM PERFORMANCE CALCULATIONS.
by P. I. Gold. 11 Oct 65, 41p NASA-CR-65442, TRW-5435-6005-TU-000
Contract NAS9-4358

Descriptors: *Chemical reaction, *Nonequilibrium flow, *Performance characteristics, *Propellant chemistry, Aluminum, Beryllium, Boron, Calculation, Carbon, Characteristics, Chemical, Chlorine, Flow, Fluorine, Hydrogen, Lithium, Metal, Nitrogen, Nonequilibrium, Oxygen, Performance, Propellant, Reaction, Rocket, Species, System.

For abstract, see STAR 04 19.

N66-37777 **Field 21B**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Manned Spacecraft Center, Houston, Tex.
FLAMMABILITY IN ZERO-GRAVITY ENVIRONMENT.
by W. R. Downs, C. H. Eldred, J. H. Kimzey, and C. W. Norris. Oct 66, 50p NASA-TR-R-246

Descriptors: *Combustion, *Ignition, *Weightlessness, Effect, Environment, Flame, Gravity, Infrared, Paraffin, Photography, Zero.

For abstracf, see STAR 04 23.

N66-37802 **Field 21B**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
THERMODYNAMIC, TRANSPORT, AND FLOW PROPERTIES FOR THE PRODUCTS OF METHANE BURNED IN OXYGEN-ENRICHED AIR.
by B. H. Croom, and E. W. Leyhe. 1966, 91p NASA-SP-3035

Descriptors: *Combustion product, *Methane, *Thermodynamic property, *Transport property, Air, Combustion, Enrichment, Flow, Gas, Mixture, Oxygen, Process, Product, Property.

For abstract, see STAR 04 23.

21C. ELECTRIC PROPULSION

N66-33463 **Field 21C**
CFSTI Prices HC$2.00 MF$0.50
General Electric Co., Philadelphia, Pa.
NAVIGATOR STUDY OF ELECTRIC PROPULSION FOR UNMANNED SCIENTIFIC MISSIONS. CONSTANT POWER MISSION ANALYSIS.
by H. Brown, and J. R. Taylor. Aug 66, 45p NASA-CR-565
Contract NAS3-2533

Descriptors: *Electric propulsion, *Flyby mission, *Nuclear propulsion, *Saturn v launch vehicle, Booster, Electric, Flyby, Generation, Launch vehicle, Mission, Navigator, Neptune, Nuclear, Plant, Pluto, Power, Propulsion, Saturn, Spacecraft, Uranus.

For abstract, see STAR 04 19.

N66-37643 **Field 21C**
CFSTI Prices HC$3.00 MF$0.75
Princeton Univ., N. J. Dept. Of Aerospace And Mechanical Sciences.
MIXING AND HEAT TRANSFER OF AN ARGON ARCJET WITH A COAXIAL FLOW OF COLD HELIUM FINAL REPORT.
by D. B. Fradkin, J. Grey, and P. M. Williams. 31 Oct 64, 66p NASA-CR-54432
Contract NAS3-3680
Its Rept.-710

Descriptors: *Arc jet, *Argon plasma, *Calorimetry, *Coaxial flow, *Helium, *Schlieren photography, Cold gas, Composition, Core, Duct, Gas, Mixing, Nuclear, Probe, Rocket, Sampling, Subsonic, Temperature, Velocity.

For abstract, see STAR 04 23.

21D. FUELS

AD-454 676 **Field 21D, 7D, 10A**
CFSTI Price: HC$12.60
American Oil Co., Whiting, Ind. Research and Development Dept.
BASIC STUDY OF SORPTION OF ORGANIC FUELS DURING OXIDATION AT ELECTRODES.
Final rept., 13 Sep 61-21 Oct 64,
Dec 64, 127p M64-341
Contract DA-11-022-ORD-4023, ARPA Order-247-61
Proj. ARO (D)-3472
Task 5
ARPA Order-247-62, Task 5.

Descriptors: (*Fuel cells, Sorption), (*Sorption, Electrodes), (*Electrochemistry, Fuel cells), Electrodes, Platinum, Mica, Films, Tantalum, Tantalum compounds, Oxides, Tracer studies, Radioactive isotopes, Carbon, Butane, Alcohols, Electrolytes, Hydroxides, Potassium compounds, Sulphuric acid, Spectra (Infrared), Reflection, Germanium, Electrons, Spin, Resonance, Free radicals, Carboxylic acids, Alkenes, Oxidation.

The objective of this program was an improved understanding of the role of sorption processes at electrodes in the electrochemical oxidation of carbonaceous fuels with special emphasis on the development of novel experimental approaches to this end. Of the many techniques studied, the radiolabled sorption, differential capacitance, voltage step and potential sweep techniques were found to be the most useful for studies of selected light hydrocarbon, methanol and formic acid fuels. (Author)

AD-641 419 **Field 21D**
CFSTI Prices: HC$6.00 MF$1.50
Phillips Petroleum Co., Bartlesville, Okla. Research Div.
THERMAL STABILITY OF HYDROCARBON FUELS.
Final summary rept. 1 Jun 65-31 May 66,
by Lucien Bagnetto. Sep 66, 270p Rept. no. 4559-66R
Contract AF 33 (657)-10639
Proj. AF-3048
Task 304801
APL-TDR-64-89-Pt-3
See also AD-621 531.

Descriptors: (*Storage, Jet engine fuels), (*Jet engine fuels, Thermal stability), Aviation fuels, Kerosene, Fuel contamination, Stability, Oxygen, Test methods.

The reliability of a small-scale (5-ml Bomb), static thermal stability test procedure, based on optical measurements of fuel compositional changes induced by thermal stressing was established. Five aviation turbine fuels, covering a range in inherent thermal stabilities from 300F to 700F, were studied to determine the effect of storage duration in sealed drums at 40F ambient, 130F and 180F on their thermal stability quality. Four of the fuels, representing straight-run production fuels were not susceptible to deterioration at these storage temperatures through the storage periods investigated. A fifth fuel, synthetic HF alkylate, showed a maximum loss of about 100F at all storage temperatures except 40F. Susceptibility is attributed to its relatively high olefinic content (about 2 volume per cent) and the presence of possible reactive tertiary hydrogen components. Removal of dissolved oxygen to less than one part per million prior to storage prevented deterioration of the HF alkylate fuel and improved the thermal stability of the poorer quality fuels. Information was also obtained on the effects of various contaminants that might be picked up during handling and storage on thermal stability of one fuel.

21E. JET AND GAS TURBINE ENGINES

AD-407 471 **Field 21E, 11F**
CFSTI Price: HC$10.60
Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
THE EVALUATION OF A LIQUID METAL REGENERATOR FOR A 3750 HP TURBOPROP ENGINE.
Final rept.
15 May 63, 101p CTR-00-275

Descriptors: (*Liquid metals, *Heat exchangers), Turbopropeller jet engine, Sodium alloys, Potassium alloys, Cesium alloys, Design, Pipes, Coolants, Stainless steel, Brazing, Non-destructive testing, Arc welding, Liquid metal pump.

Feasibility of a liquid metal heat exchange system as a versatile, high reliability component meeting the compactness and high performance characteristics required for the Navy's regenerative turboprop engine has been demonstrated. (Author)

AD-457 934 **Field 21E**
CFSTI Price: HC$2.00
Auburn Univ., Ala. Dept. of Mechanical Engineering.
THERMAL DIFFUSIVITY OF SOLID PROPELLANTS DEVELOPMENT OF APPARATUS AND INITIAL TEST RESULTS.
Progress rept. no. 8, Nov 63-Feb 64,
by G. E. Tanger. Mar 64, 37p
Contract DA-01-009-ORD-1023

Descriptors: (*Propellant grains, Thermal diffusion), Measurement, Thermal conductivity, Test equipment, Heat transfer, Test methods, Calibration, Laboratory equipment, Density, Specific heat, Experimental data, Mathematical analysis, Design.

Results of recent tests on the thermal conductivity of Pershing propellant are included in the report. These tests were performed at the propulsion laboratory of the Army Missile Command, Huntsville, Alabama. A transient heat transfer system has been constructed and tested in an attempt to determine the thermal diffusivity of solid propellant. Details on the construction and calibration of the apparatus are given in the report. Also, thermal conductivity has been determined for an inert propellant sample by the line-source and steady-state methods used previously. The density of the specimen was measured and the specific heat was calculated in order to provide a complete thermal analysis. Derivation of a series solution for the problem of transient heat flow in a semi-infinite solid is given in an appendix. The equations are programmed so as to obtain a trial-and-error solution for the thermal diffusivity. (Author)

N66-33341 **Field 21E**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE EVALUATION OF A TWO-STAGE TURBINE DESIGNED FOR A RATIO OF BLADE SPEED TO JET SPEED OF 0.146.
by M. G. Kofskey. Jan 60, 39p NASA-TM-X-146

Descriptors: *Liquid propellant rocket engine, *Turbine blade, *Two-stage turbine, Air, Axial, Blade, Bleed, Cold, Design, Efficiency, Flow, Fuel, Height, Liquid, Low, Performance, Propellant, Ratio, Rocket engine, Rotor, Shroud, Specific, Stage, System, Turbine, Work.

For abstract, see STAR 04 19.

AD-641 758 **See Field 21B**

21H. ROCKET MOTORS AND ENGINES

AD-478 023 **Field 21H, 21I**
CFSTI Prices: HC$3.00 MF$0.75
Jet Propulsion Center, Purdue Univ., Lafayette, Ind.
HIGH FREQUENCY COMBUSTION PRESSURE OSCILLATIONS IN MOTORS BURNING GASEOUS PROPELLANTS,
by J. M. Zucrow, J. R. Osborn, and J. M. Bonnell. Aug 65, 85p Technical memo TM-65-5, JPC-409
Grants AF-AFOSR-62-360, AF-AFOSR-753-65

Descriptors: (*Combustion, Rocket motors), (*Gaseous rocket propellants, Combustion), Pressure, Oscillation, Combustion chambers, Geometric forms, Configuration, Chemical properties, Fuel injection, Stability, Mixtures.

A series of experiments was conducted for determining the factors that promote combustion pressure oscillations in rocket motors burning either premixed or unmixed gaseous propellants. The influences of the following parameters were investigated: combustion chamber geometry, the chemical differences in the propellants, and several injection variables. Auxiliary investigations were conducted for determining the effects of baffles located in the combustion chambers, and the applicability of linear theories for predicting the occurrence of combustion pressure oscillations in gaseous propellant motors. (Author)

AD-641 892 **Field 21H, 21I**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
COMMUNIST CHINESE ROCKET PROPULSION TECHNOLOGY: COMPILATION OF ABSTRACTS.
11 Jul 66, 29p ATD-66-89
TT-66-62592
Rept. on Surveys of Foreign Scientific and Technical Literature.

Descriptors: (*Rocket propulsion, China), Abstracts, Rocket motors, Shock waves, Thrust vector control systems, Combustion, Flame propagation, Solid rocket propellants, Liquid rocket propellants, Rocket propellant grains, Pyrometers, Film cooling, Combustion chambers, Supersonic flow, Heat-resistant materials, Trajectories.

This compilation of abstracts is based on CHICOM open sources published 1960-1966. It consists of 31 abstracts dealing with solid and liquid rocket propulsion technology. The abstracts are arranged alphabetically by author. Pertinent information included: shock-wave tube, thrust vector control and secondary injection for solid-propellant rockets, rocket materials (body and engine materials), chemical problems in combustion and flame, problems of rocket propellant chemistry, stress analysis of cast solid rocket grains, pyrometers, heat transfer in turbojet combustion chambers, film cooling effects, supersonic flow of nonequilibrium dissociating gas passing through a circular cone at an incidence angle, mathematical principles for rocket flights. (Author)

N66-32923 **Field 21H**
CFSTI Prices HC$3.75 MF$1.25
Rocketdyne, Canoga Park, Calif. Research Dept.
FLUORINE-HYDROGEN PERFORMANCE EVALUATION. PHASE I, PART I - ANALYSIS, DESIGN, AND DEMONSTRATION OF HIGH PERFORMANCE INJECTORS FOR THE LIQUID FLUORINE-GASEOUS HYDROGEN COMBINATION FINAL REPORT.
by H. A. Arbit, and S. D. Clapp. Aug 66, 224p NASA-CR-54978, R-6636-1
Contract NASW-1229

Descriptors: *Fuel injection, *Injector, *Liquid propellant, *Propellant testing, Analysis, Chamber, Design, Engine, Fluorine, Fuel, Gaseous, High performance, Hydrogen, Impulse, Injection, Liquid, Propellant, Rocket, Testing.

For abstract, see STAR 04 19.

N66-33332 **Field 21H**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
INVESTIGATION OF SMALL-SCALE HYDRAZINE- FLUORINE INJECTORS.
by R. J. Rollbuhler, and W. A. Tomazic. Jan 59, 17p NASA-MEMO-1-23-59E

Descriptors: *Fluorine, *Fuel injection, *Hydrazine, *Liquid propellant rocket engine, Corrosion, Erosion, Flow, Flux, Fuel, Function, Head, Heat, Injection, Injector, Liquid, Percentage, Performance, Propellant, Rocket engine, Shower, Test, Triplet, Uncooled, Weight.

For abstract, see STAR 04 19.

N66-33333 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
INVESTIGATION OF INJECTORS FOR A LOW-CHAMBER- PRESSURE HYDROGEN-FLUORINE ROCKET ENGINE.
by R. J. Lubick, H. G. Price Jr. and A. M. Shinn Jr. Jul 62, 30p NASA-TM-X-485

Descriptors: *Fluorine, *Fuel injection, *High energy propellant, *Hydrogen fuel, *Pressure drop, *Rocket chamber, Chamber, Coaxial, Combustion, Fuel, Gaseous, Head, High energy, Hydrogen, Injection, Injector, Liquid, Low, Pressure, Propellant, Rocket, Shower, Velocity.

For abstract, see STAR 04 19.

N66-33342 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL PERFORMANCE OF LIQUID HYDROGEN AND LIQUID FLUORINE IN REGENERATIVELY COOLED ROCKET ENGINES.
by H. W. Douglass, G. Hennings, and H. G. Price Jr. Nov 59, 57p NASA-TM-X-87

Descriptors: *Hydrogen fuel, *Liquid, *Liquid propellant rocket engine, *Regenerative cooling, Bulk, Combination, Combustion, Cooling, Density, Efficiency, Fluorine, Fuel, Heat transfer, Hydrogen, Impulse, Injector, Oxidizer, Performance, Pressure, Propellant, Regeneration, Rocket engine, Specific, Stability, Thrust.

For abstract, see STAR 04 19.

N66-33344 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTS WITH HYDROGEN AND OXYGEN IN REGENERATIVE ENGINES AT CHAMBER PRESSURES FROM 100 TO 300 POUNDS PER SQUARE INCH ABSOLUTE.
by E. R. Bartoo, R. J. Rollbuhler, and W. A. Tomazic. Apr 60, 39p NASA-TM-X-253

Descriptors: *Combustion chamber, *Liquid hydrogen, *Liquid oxygen (lox), *Regenerative cooling, Chamber, Combustion, Cooling, Damage, Equilibrium, Expansion, Head, Heat transfer, Hydrogen, Impulse, Injector, Lightweight, Liquid, Low frequency, Lox, Oscillation, Oscillator, Oxygen, Pressure, Regeneration, Shower, Specific, Thrust, Wall.

For abstract, see STAR 04 19.

N66-33346 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
PRELIMINARY INVESTIGATION OF OFF-DESIGN PERFORMANCE OF DIVERGENT-EJECTOR-TYPE ROCKET NOZZLES.
by L. W. Gertsma, and R. A. Yeager. Mar 60, 49p NASA-TM-X-250

Descriptors: *Divergent nozzle, *Ejector, *Rocket nozzle, Augmentation, Convergence, Design, Divergence, Jet, Nozzle, Performance, Pump, Rocket, Rocket engine, Testing, Thrust.

For abstract, see STAR 04 19.

N66-33348 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL PERFORMANCE OF A HYDROGEN- FLUORINE ROCKET ENGINE AT SEVERAL CHAMBER PRESSURES AND EXHAUST-NOZZLE EXPANSION AREA RATIOS.
by C. A. Aukerman, J. W. Gibb, and W. L. Jones. Oct 60, 39p NASA-TM-X-387

Descriptors: *Chamber pressure, *Fluorine, *Hydrogen fuel, *Liquid propellant rocket engine, *Nozzle expansion, Area, Chamber, Exhaust, Expansion, Fuel, Hydrogen, Liquid, Nozzle, Performance, Pressure, Propellant, Ratio, Rocket engine, Testing.

For abstract, see STAR 04 19.

N66-33496 **Field 21H**
CFSTI Prices HC$2.50 MF$0.75
Vickers, Inc., Troy, Mich. Research And Development Div.
ANALYTICAL AND EXPERIMENTAL STUDY OF ALTITUDE COMPENSATION OF A ROCKET BY SECONDARY INJECTION.
Jul 66, 98p NASA-CR-66155
Contracts NAS1-4102, NAS1-2962

Descriptors: *Altitude control, *Mixed flow, *Rocket engine, *Supersonic flow, *Thrust augmentation, Altitude, Augmentation, Compensation, Control, Effect, Flow, Gas, Injection, Mathematics, Mixing, Model, Nozzle, Port, Pressure, Supersonic, Temperature, Thrust.

For abstract, see STAR 04 19.

N66-33541 **Field 21H**
CFSTI Prices HC$3.75 MF$1.50
Thiokol Chemical Corp., Elkton, Md.
DESIGN STUDY OF HEAT STERILIZABLE SOLID ROCKET MOTORS FOR SPACE APPLICATION, VOLUME I FINAL REPORT, OCT. 19, 1965 - JAN. 9, 1966.
27 Jun 66, 275p NASA-CR-77065
Contracts NAS7-100, JPL-951405
Prepared For Jpl

Descriptors: *Engine design, *Solid propellant rocket engine, *Sterilization, Analysis, Cycle, Design, Engine, Expansion, Heat, Method, Performance, Propellant, Rating, Rocket, Solid, Stress.

For abstract, see STAR 04 19.

N66-34042 **Field 21H**
CFSTI Prices HC$3.00 MF$0.75
Bell Aerosystems Co., Buffalo, N. Y.
PHOTOGRAPHIC INVESTIGATION OF PROPELLANT STREAM BEHAVIOR IN A FIRING ROCKET ENGINE, VOLUME I TECHNICAL SUMMARY REPORT, 1 AUG. 1964 - 28 FEB. 1966.
by R. N. Eulner, T. G. Rossmann, and L. M. Wood. 24 Jun 66, 96p NASA-CR-77133
Contract NAS8-11364
Its Rept.-9136- 950001

Descriptors: *Combustion, *F- 1 rocket engine, *Injection, Chamber, Element, Firing, Gas, Injector, Pattern, Photography, Propellant, Protection, Rocket engine, Stream, Thermal.

For abstract, see STAR 04 19.

N66-34045 **Field 21H**
CFSTI Prices HC$4.00 MF$1.00
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
TEMPERATURE AND DENSITY MEASUREMENTS IN THE BASE REGION OF A CLUSTERED ROCKET MODEL USING AN ELECTRON BEAM TECHNIQUE.
by J. Llinas, and W. C. Rustay. Jul 66, 119p
NASA-CR-77126, CAL-HM-2107-Y-2
Contract NSR-33-009-030

Descriptors: *Base flow, *Density measurement, *Electron beam, *Rocket engine, *Temperature measurement, Base, Beam, Booster, Cluster, Density, Electron, Field, Flow, Heat transfer, Measurement, Model, Pressure, Region, Saturn, Temperature.

For abstract, see STAR 04 19.

N66-37804 **Field 21H**
CFSTI Prices HC$2.50 MF$0.75
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
PROPELLANT EXPULSION IN UNMANNED SPACECRAFT.
by R. N. Porter, and H. B. Stanford. 1 Jul 66, 76p
NASA-CR-78439, JPL-TR-32-899
Contract NAS7-100

Descriptors: *Expulsion, *Liquid propellant, *Unmanned spacecraft, Bladder, Device, Diaphragm, Earth, Fall, Free, Gravity, Piston, Storage, Zero.

For abstract, see STAR 04 23.

N66-37805 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
AN EXPERIMENTAL EVALUATION OF 100-LB-THRUST ABLATIVELY COOLED ROCKET ENGINES.
by R. N. Porter, and W. H. Tyler. 1 Oct 66, 35p
NASA-CR-78440, JPL-TR-32-978
Contract NAS7-100

Descriptors: *Ablation, *Rocket chamber, *Test firing, Bipropellant, Carbide, Chamber, Combustion, Firing, Insert, Liquid, Molybdenum, Silicon, Throat, Thrust.

For abstract, see STAR 04 23.

N66-37993 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CRYOGENIC TECHNOLOGY RESEARCH AT MSFC.
1965, 43p NASA-TM-X-53515
Its Res. Achievements Rev. Ser. No. 3

Descriptors: *Cryogenics, *Fluid mechanics, *Propellant storage, *Spacecraft instrumentation, Cooling, Detection, Explosive, Fire, Geyser, Hazard, Instrumentation, Insulation, Meter, Pressurization, Quality, Refrigeration, Research, Shadow, Shield, Space vehicle, Technology, Thermodynamics.

For abstract, see STAR 04 23.

N66-38417 **Field 21H**
CFSTI Prices HC$3.00 MF$1.00
National Aeronautics And Space Administration. Manned Spacecraft Center, Houston, Tex.
SOLID PROPELLANT ROCKET MOTOR PERFORMANCE COMPUTER PROGRAMS USING THE GROUP TRANSFORMATION METHOD.
by P. B. Burchfield, and B. J. Lee. Oct 66, 123p
NASA-TN-D-3667

Descriptors: *Computer program, *Performance characteristics, *Solid propellant rocket engine, Analysis, Characteristics, Combustion, Evaluation, Group, Nozzle, Propellant, Sensitivity, Statistical, Thermal,. Throat, Transformation.

For abstract, see STAR 04 23.

N66-38503 **Field 21H**
CFSTI Prices HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
AN EXPERIMENTAL EVALUATION OF 100-LB-THRUST ABLATIVELY COOLED ROCKET ENGINES.
by R. N. Porter, and W. H. Tyler. 1 Oct 66, 29p
NASA-CR-78548, JPL-TR-32-978
Contract NAS7-100

Descriptors: *Rocket engine, *Test firing, Ablation, Bipropellant, Carbide, Cooling, Erosion, Hydrazine, Insert, Liquid, Molybdenum, Nitrogen, Pressure, Silicon, Tetroxide, Throat.

For abstract, see STAR 04 23.

AD-641 612 **See Field 21B**

NBS-TN-295 **See Field 14B**

21I. ROCKET PROPELLANTS

N66-33309 **Field 21I**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF JP-4 FUEL WITH FLUORINE- OXYGEN MIXTURES IN 1000-POUND-THRUST ROCKET ENGINES.
by H. W. Douglass, and D. L. Nored. 11 Jun 58, 35p NACA-RM-E58C18

Descriptors: *Fluorine-liquid oxygen (flox), *Injector, *Jp-4 jet fuel, *Rocket engine, Atomization, Cool, Flox, Fluorine, Fuel, Heat transfer, Jet, Liquid, Oxidation, Oxygen, Propellant, Water.

For abstract, see STAR 04 19.

N66-33325 **Field 21I**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL HYDROGEN-FLUORINE ROCKET PERFORMANCE AT LOW PRESSURES AND HIGH RATIOS.
by C. Aukerman, and B. E. Church. Sep 63, 35p
NASA-TM-X-724

Descriptors: *Chamber pressure, *Combustion chamber, *Exhaust nozzle, *Fluorine, *Hydrogen, *Rocket engine, Area, Chamber, Combustion, Exhaust, High, Low pressure, Nozzle, Performance, Pressure, Ratio, Thrust.

For abstract, see STAR 04 19.

N66-33433 **Field 21I**
CFSTI Prices HC$2.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
EFFECTIVE MOMENT OF INERTIA AND VELOCITY RATIO FOR LIQUID-FILLED CYLINDRICAL TANKS OSCILLATING ABOUT THE LONGITUDINAL AXIS.
by J. L. Diven. Mar 66, 50p NASA-CR-76861, R-182
Contract NAS8-20073

Descriptors: *Cylindrical tank, *Inertia moment, *Liquid sloshing, *Liquid-filled shell, *Oscillating cylinder, Axis, Coefficient, Cylinder, Dynamics, Fluid, Inertia, Liquid, Longitudinal, Moment, Motion, Navier-stokes

equation, Oscillation, Propellant, Ratio, Shear, Sloshing, Stress, Tank, Velocity, Viscosity, Wall.

For abstract, see STAR 04 19.

N66-33454 **Field 21I**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL ROCKET PERFORMANCE OF APOLLO STORABLE PROPELLANTS IN ENGINES WITH LARGE AREA RATIO NOZZLES.
by C. A. Aukerman, and A. M. Trout. Aug 66, 45p NASA-TN-D-3566
Contract 104-31-02-01-22

Descriptors: *Apollo project, *Hydrazine, *Nitrogen oxide, *Rocket nozzle, *Storable propellant, Chamber, Combustion, Dimethyl, Module, Nitrogen, Nozzle, Oxide, Propellant, Rocket, Rocket engine, Service, Storage, Supersonic, Thrust, Unsymmetrical.

For abstract, see STAR 04 19.

N66-33710 **Field 21I**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL INVESTIGATION OF BAFFLE EFFECTIVENESS IN A CONFINED FLUID SUBJECTED TO WALL AND NONUNIFORM SOURCE HEATING.
by T. J. Biesiadny. Aug 66, 66p NASA-TM-X-57817

Descriptors: *Heating, *Liquid hydrogen, *Nuclear rocket, *Propellant tank, *Propellant testing, Alcohol, Baffle, Ethyl, Fluid, Hydrogen, Liquid, Measurement, Nuclear, Point, Propellant, Rocket, Simulation, Source, Tank, Temperature, Testing, Trichloroethane, Wall.

For abstract, see STAR 04 19.

AD-478 023 **See Field 21H**

AD-641 602 **See Field 21B**

AD-641 892 **See Field 21H**

22A. ASTRONAUTICS

AD-641 695 **Field 22A**
CFSTI Price: MF$2.25
Martin Co., Baltimore, Md.
NATIONAL CONFERENCE ON SPACE MAINTENANCE AND EXTRA-VEHICULAR ACTIVITIES.
3 Mar 66, 508p
Proj. AF-8170
AFAPL-CONF-66-8
Conference held 1-3 Mar. 66, Orlando, Fla.
Availability: National Conference on Space Maintenance and EVA, Post Office Box 5056, Baltimore, Md. 21220 $8.00.

Descriptors: (*Space maintenance, Symposia), (*Astronautics, Symposia), Space flight, Space tools, Thrust vector control systems, Maneuverability, Pressure suits, Space simulation chambers, Man-machine systems, Human engineering, Spacecraft, Reliability, Maintainability, Lunar surface vehicles, Astronauts, Performance (Human).

Identifiers: Astronaut maneuvering systems, Extravehicular activities.

These proceedings are comprised of the papers presented at the 'first' National Conference on Space Maintenance and Extravehicular Activities convened for the initial exchange of ideas in these fields. Specialists presented their work in the fields of space maintenance and EVA space missions and requirements, space maintenance technology, maneuvering unit technology, associated space experiments and simulation, man-machine interface problems, and space maintainability and reliability.

AD-641 903 **Field 22A**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
EXPANDABLE AND MODULAR STRUCTURES TECHNOLOGY FOR SUPPORT OF MANNED MISSIONS,
by Fred W. Forbes, and Michael I. Yarymovych. 1966, 16p AFAPL-CONF-67-5
Proj. AF-8170
Presented at the International Astronautical Federation Congress (17th), October 10-15, 1966, Madrid, Spain.

Descriptors: (*State-of-the-art reviews, *Modular space construction), (*Expandable structures, State-of-the-art reviews), (*Manned spacecraft, Structures).

The most current technology for expandable and modular structures with direct emphasis on the immediate and future application to manned space missions is presented. The scope is limited to the following: a brief review of key historical accomplishments, major results of research efforts in expandable and modular structures, and immediate and longer range manned applications for these structures. (Author)

AD-641 973 **Field 22A**
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems, Redondo Beach, Calif.
MANNED EXPLORATION, COLONIZATION AND EXPLOITATION OF THE LUNAR SURFACE: A SELECTIVE BIBLIOGRAPHY.
Special literature survey no. 26,
by L. R. Magnolia. 10 Oct 66, 15p Rept. no. 99900-6045-T000

Descriptors: (*Lunar environment, Bibliographies), Lunar bases, Lunar craft, Lunar surface vehicles, Astronautics, Manned, Moon, Survival.

The report lists 124 references which are all available to the public.

N66-32760 **Field 22A**
CFSTI Prices HC$1.00 MF$0.50
Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.
SCOPE OF WORK FOR SCIENTIFIC AND TECHNICAL ASSISTANCE FOR THE PLANETARY QUARANTINE MISSION FIRST QUARTERLY REPORT, PERIOD ENDING JUN. 30, 1966.
Jul 66, 17p NASA-CR-76987
NASA ORDER R-09-019-040

Descriptors: *Clean room, *Mathematical model, *Spacecraft contamination, Aerosol, Assembly, Clean, Contamination, Design, Mathematics, Microbiology, Model, Particle, Planetary, Prediction, Program, Room, Sampler, Spacecraft, Stochastic.

For abstract, see STAR 04 19.

N66-32944 **Field 22A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
ANALYSIS OF COMBINATIONS OF ALTITUDE AND DESCENT RATE FOR SAFE ABORT DURING TERMINAL PHASE OF LUNAR LANDING.
by G. P. Beasley. Aug 66, 30p NASA-TN-D-3525

Descriptors: *Abort, *Lunar landing, Altitude, Angle, Attitude, Boundary, Combination, Control, Curve, Descent, Landing, Lunar, Phase, Pitch, Rate, Reaction, Rocket, Safety, Terminal, Thrust.

For abstract, see STAR 04 19.

N66-32945 **Field 22A**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ANALYSIS OF LUNAR AND SOLAR EFFECTS ON THE MOTION OF CLOSE EARTH SATELLITES.
by T. L. Felsentreger, and J. P. Murphy. Aug 66, 78p NASA-TN-D-3559

Descriptors: *Long period effect, *Lunar effect, *Satellite perturbation, *Solar effect, Earth satellite, Effect, Formula, Long, Lunar, Motion, Orbit, Period, Perturbation, Radiation, Relay i satellite, Satellite, Solar, Telstar ii satellite.

For abstract, see STAR 04 19.

N66-32960 **Field 22A**
CFSTI Prices HC$4.66 MF$2.50
Texaco Experiment, Inc., Richmond, Va.
LUNAR GEOPHYSICAL SURFACE AND SUBSURFACE PROBES FOR APOLLO APPLICATIONS PROGRAM - VOLUME I - DETAILED TECHNICAL REPORT FINAL REPORT.
by R. H. Clinard Jr. 27 May 66, 516p NASA-CR-76721, EXP-462, VOL. I
Contract NAS8-20085

Descriptors: *Apollo project, *Geophysics, *Lunar surface, Acoustic, Cable, Electronic, Equipment, Experiment, Gamma, Instrument, Lunar, Neutron, Operation, Probe, Requirement, Subsurface, Surface.

For abstract, see STAR 04 19.

N66-32961 **Field 22A**
CFSTI Prices HC$3.00 MF$0.75
Texaco Experiment, Inc., Richmond, Va.
LUNAR SURFACE AND SUBSURFACE PROBES FOR APOLLO APPLICATIONS PROGRAM. VOLUME II - SUMMARY TECHNICAL REPORT FINAL REPORT.
by R. H. Clinard Jr. 27 May 66, 109p NASA-CR-76720, EXP-462, VOL. II
Contract NAS8-20085

Descriptors: *Apollo project, *Lunar surface, Design, Equipment, Gamma, Instrumentation, Lunar, Neutron, Probe, Subsurface, Surface, System, Television.

For abstract, see STAR 04 19.

N66-33395 **Field 22A**
CFSTI Prices HC$1.00 MF$0.50
George Washington Univ., Washington, D. C.
THE SOVIET UNION AND THE UNITED STATES IN SPACE - MEMORANDUM OF THE SEMINARS, 23 MARCH - 20 APRIL 1965.
by C. H. Stacey. Mar 66, 24p NASA-CR-77006
Grant NSG-727

Descriptors: *Nasa program, *U.s.s.r. space program, *United states, Advantage, Biology, Conference, Exploration, Flight, Government, Industry, Lunar, Manned, Payload, Physical, Planetary, Program, Science, Space, Space program, Tracking, University.

For abstract, see STAR 04 19.

N66-33696 **Field 22A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Washington, D. C.

SELECTION OF PARAMETERS FOR A DYNAMIC SYSTEM UNIVERSAL FOR A GIVEN GROUP OF MANEUVERS.
K Vyboru Parametrov Dinamicheskoy Sistemy, Universal'noy Dlya Zadannogo Klassa Manevrov
by V. V. Tokarev. May 66, 25p NASA-TT-F-10133
Transl. Into English From Russian

Descriptors: *Gravitational field, *Payload, *Spacecraft maneuver, Dynamic, Field, Gravitational, Jet, Module, Optimum, Parameter, Power, Science, Selection, Space, System, Universal.

For abstract, see STAR 04 19.

N66-33698 **Field 22A**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
OPTIMAL CONDITIONS OF DECELERATING THE ROTATIONAL MOTION OF A SYMMETRIC BODY.
Optimal'nyye Rezhimy Tormozheniya Vrashcha-Tel'nogo Dvizheniya Simmetrichnogo Tela
by B. A. Smolnikov. May 66, 23p NASA-TT-F-10140
Transl. Into English From Prikl. Mat. I Mekh. (Moscow), V. 28, No. 4, 1964 P 725-734

Descriptors: *Angular velocity, *Deceleration, *Jet engine, *Symmetrical body, *Torque motor, Analysis, Angular, Body, Braking, Engine, Jet, Mathematics, Motor, Operation, Phase, Symmetry, Torque, Trajectory, Velocity.

For abstract, see STAR 04 19.

N66-38414 **Field 22A**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
AN ANALOG STUDY OF THE PASSIVE THERMAL BEHAVIOR OF AN ORBITING SPACE STATION.
by L. G. Clark, and J. W. Wilson. Oct 66, 38p NASA-TN-D-3654

Descriptors: *Analog computer, *Orbital space station, *Thermal environment, Control, Crew, Equation, Fourier analysis, Heat transfer, Linear, Module, Spacecraft, Study, Surface, Wall.

For abstract, see STAR 04 23.

N66-38486 **Field 22A**
CFSTI Prices HC$3.00 MF$1.00
National Aeronautics And Space Administration, Washington, D. C.
THE FIRST PANORAMIC VIEWS OF THE LUNAR SURFACE.
Oct 66, 132p NASA-TT-F-393
Transl. Into English Of The Book "pervyye Panoramy Lunnoy Poverkhnosti" Moscow, Izd. "nauka", 1966

Descriptors: *Lunar photograph, *Soft landing, *Spacecraft television, Control, Flight, Landing, Log, Lunar, Morphology, Panorama, Performance, Rocket, Site, Station, Surface, Trajectory, Transmission, U.s.s.r..

For abstract, see STAR 04 23.

N66-38489 **Field 22A**
CFSTI Prices HC$2.50 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
AEROBEE 150 STRUCTURAL AND AERODYNAMIC PITCH COUPLING.
by J. R. Busse, and G. E. Kraft. Oct 66, 58p NASA-TM-X-1279

Descriptors: *Aerobee rocket, *Coupling, *Data analysis, *Failure, *Flight characteristics, Aerodynamic, Analysis, Bending, Body, Data, Flight, Low, Mode, Performance, Pitch, Reduction, Roll, Structural, Yaw.

For abstract, see STAR 04 23.

N66-38505 **Field 22A**
CFSTI Prices HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
MARINER - JOURNEY AROUND THE SUN.
1966, 24p NASA-CR-78551, JPL-TM-33-302
Contract NAS7-100

Descriptors: *Mariner iv space probe, *Planetary exploration, *Unmanned spacecraft, Attitude, Cell, Communication, Control, Corona, Mars (planet), Orbit, Signal, Solar, Spacecraft, Sun, Telemetry, Tracking.

For abstract, see STAR 04 23.

AD-641 851 **See Field 5A**

22B. SPACECRAFT

AD-457 945 **Field 22B**
CFSTI Price: HC$3.00
Institute for Defense Analyses, Arlington, Va.
MULTIPLE ACCESS TO A COMMUNICATION SATELLITE WITH A HARD-LIMITING REPEATER. VOLUME I. MODULATION TECHNIQUES AND THEIR APPLICATIONS,
by J. Kaiser, J. W. Schwartz, and J. M. Aein. Jan 65, 85p R-108-Vol-1, IDA/HQ65-3276
Contract SD50
Task 10
Vomume II is AD-465 789.

Descriptors: (*Communication satellites (active), Operation), Power, Traveling-wave tubes, Amplifiers, Modulation, Frequency, Networks, Load distribution, Correlators, Detection, Interference, Performance (Engineering).

Identifiers: Multiple access.

Discussed are four modulation techniques applicable to a wide-band non-linear repeater and their operational characteristics. Modulation techniques that depend entirely on a linear repeater characteristic are not treated. If it becomes possible to operate a satellite repeater as a linear device, even over a restricted dynamic range, the modulation techniques discussed here will remain applicable. Because it is important to accommodate stations with large and small receiving and transmitting capabilities in the same network, this report does not deal with modulation techniques that require equal sensitivities for all receiving stations (i.e., equal antenna size and equal receiver noise temperatures). The sections dealing with modulation techniques are preceded by a brief account of the main properties and constraints upon a communication satellite system; they are followed by three sections dealing with repeater bandwidth and power-sharing considerations, network timing, and operational doctrine. (Author)

AD-465 789 **Field 22B**
CFSTI Prices: HC$6.00 MF$1.50
Institute for Defense Analyses, Arlington, Va.
MULTIPLE ACCESS TO A COMMUNICATION SATELLITE WITH A HARD-LIMITING REPEATER,
by J. M. Aein, and J. W. Schwartz. Apr 65, 296p R-108-VOL-2, IDA/HQ65-3277-F
Contract SD50
Task 10
Vol I is AD-457 945.

Descriptors: (*Communication satellites (Active), Symposia), (*Military satellites, Communication satellites (Active)), (*Symposia, Communication satellites (Active)), Radio receivers, Radio interference, Data transmission systems, Frequency modulation, Time, Multiplex, Feedback, Limiters, Radio transmitters, Communication theory, Synchronization (Electronics), Radiofrequency pulses, Radiofrequency power, Coding, Frequency shift keyers, Pulse communication systems, Modulators, Pulse modulation, Switching circuits, Signal-to-noise ratio, Radio signals, Radio transmission, Radio reception, Satellite networks, Probability, Radio equipment, Timing circuits, Feedback, Noise (Radio).

Identifiers: Multiple access, Time division multiplex, Frequency division multiplex, Spread spectrum technique, Orthogonal signals.

Contents: Multiple access modulation techniques; Time-division multiple access; Frequency-division multiple access; Spread-spectrum multiple access; Pulse-address multiple access with narrow-band pulses; Pulse-address multiple access with spread spectrum pulses; Network timing; Signal waveform analysis; Probability distributions.

AD-641 676 **Field 22B**
CFSTI Prices: HC$5.00 MF$1.00
Space General Corp., El Monte, Calif.
AERODYNAMIC AND FLIGHT PERFORMANCE ANALYSIS FOR THE NIRO SOUNDING ROCKET,
by J. P. Taylor, and A. M. Olson. Mar 66, 140p SGC-916FR-1, Scientific-1-app-A
Contract AF 19 (628)-5520
Proj. AF-7659
Task 765904
AFCRL-66-460 (A)

Descriptors: (*Sounding rockets, Flight testing), Aerodynamic characteristics, Performance (Engineering), Trajectories, Payload, Flight paths, Altitude, Weight, Propulsion, Drag.

Identifiers: NIRO sounding rocket.

Contained in the report are the results of systematic calculations of the NIRO vehicle performance capabilities. These capabilities were determined by computing the vehicle trajectory characteristics for various payload weights and configurations. Trajectory parameters are presented as time-histories of velocity, altitude, range, flight path angle, Mach Number, and dynamic pressure. From these data, summary curves are provided giving velocity and altitude at major time points (i.e., stage ignition, burnout, and apogee) as a function of payload weight, and plots showing apogee altitude and impact range as a function of payload weight and launch angle (with constant apogee time lines). A set of data are given for each payload configuration. Also, included for information, are the vehicle weight, propulsion, and drag data used in these computations. (Author)

N66-32705 **Field 22B**
CFSTI Prices HC$3.00 MF$0.75
Philco Corp., Palo Alto, Calif. Western Development Labs.
SOLAR PROBE STUDY. BOOK A, APPENDIX 2 - MISSION ANALYSIS.
30 Aug 63, 76p NASA-CR-63841, WDL-TR2133
Contract NAS2-1397

Descriptors: *Factor analysis, *Flight mechanics, *Solar probe, Analysis, Atlas agena launch vehicle, Atlas centaur launch vehicle, Booster, Factor, Flight, Interplanetary, Launch, Mechanics, Mission, Orbit, Probe, Solar, Spacecraft, Study, Trajectory, Vehicle.

For abstract, see STAR 04 19.

N66-32955 Field 22B
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
MEASURED PERFORMANCE OF WATER VAPOR JETS FOR SPACE VEHICLE ATTITUDE CONTROL SYSTEMS.
by G. Kanning. Aug 66, 27p NASA-TN-D-3561

Descriptors: *Attitude control, *Space environment, *Spacecraft control, *Thrustor, *Water vapor, Attitude, Control, Environment, Impulse, Jet, Performance, Pulse, Spacecraft, Specific, System, Vacuum, Vapor, Water.

For abstract, see STAR 04 19.

N66-33075 Field 22B
CFSTI Prices HC$6.00 MF$4.75
Electro-optical Systems, Inc., Pasadena, Calif.
INSTRUMENTS AND SPACECRAFT, OCTOBER 1957 - MARCH 1965 SPACE MEASUREMENTS SURVEY.
by H. L. Richter Jr. 1966, 1013p NASA-SP-3028
Contract DA-49-146-XZ-100
Sponsored By Nasa

Descriptors: *Instrument package, *Satellite, *Space probe, *Spacecraft instrumentation, Data, Design, Instrument, Instrumentation, List, Orbital, Package, Parameter, Power, Probe, Space, Spacecraft, Survey, System, Table.

For abstract, see STAR 04 19.

N66-33076 Field 22B
CFSTI Prices HC$3.75 MF$1.50
National Aeronautics And Space Administration, Washington, D. C.
STRUCTURAL SYSTEMS AND PROGRAM DECISIONS, VOLUME 2.
1966, 276p NASA-SP-6008

Descriptors: *Computer programming, *Optimization, *Structural weight, Computer, Construction, Control, Decision, Performance, Program, Programming, Stress, Structural, Subroutine, System, Weight.

For abstract, see STAR 04 19.

N66-33352 Field 22B
CFSTI Prices HC$3.75 MF$1.25
National Aeronautics And Space Administration, Washington, D. C.
THERMAL PROTECTION SYSTEMS. ASPECTS OF THERMAL PROTECTION OF INTEREST TO NASA AND THE RELATED MATERIALS R AND D REQUIREMENTS.
Feb 62, 216p NASA-TM-X-650

Descriptors: *Aerospace technology, *Materials science, *Power plant, *Space vehicle, *Thermal protection, Aerospace, Control, Material, Nozzle, Plant, Power, Protection, Reentry, Rocket, Science, Technology, Testing, Thermal.

For abstract, see STAR 04 19.

N66-33397 Field 22B
CFSTI Prices HC$1.00 MF$0.50
Consultants And Designers, Inc., Arlington, Va.
LUNA-10 COMPLETED ITS PROGRAM OF SCIENTIFIC INVESTIGATIONS.
6 Jun 66, 9p NASA-CR-77010, ST-PR-10496
Contract NAS5-9299
Transl. Into English From Pravda (Moscow), No. 154 (17471), 3 Jun. 1966

Descriptors: *Lunar probe, *U.s.s.r. space program, Lunar, Moon, Probe, Program, Satellite, Space, Station, U.s.s.r..

For abstract, see STAR 04 19.

N66-33407 Field 22B
CFSTI Prices HC$2.00 MF$0.50
Boeing Co., Seattle, Wash. Space Div.
THE LUNAR ORBITER.
Apr 66, 47p NASA-CR-70499
Prepared For Nasa Revised

Descriptors: *Data handling system, *Lunar exploration, *Unmanned spacecraft, Attitude, Communication, Control, Data, Electric, Exploration, Handling, Lunar, Mission, Orbit, Photography, Spacecraft, System, Unmanned, Velocity.

For abstract, see STAR 04 19.

N66-33490 Field 22B
CFSTI Prices HC$2.50 MF$0.75
General Dynamics/fort Worth, Tex.
MANNED SPACECRAFT SYSTEMS COST MODEL, VOLUME II. SUMMARY REPORT, APR. 1965 - JUN. 1966.
by D. E. Wagner. 18 Jul 66, 65p NASA-CR-65446, FZM-4671-2, VOL. II
Contract NAS9-3954

Descriptors: *Cost estimate, *Manned spacecraft, *Mathematical model, *Spacecraft design, Computer, Cost, Design, Estimate, manned, Mathematics, Model, Nasa program, Program, Spacecraft.

For abstract, see STAR 04 19.

N66-33497 Field 22B
CFSTI Prices HC$2.00 MF$0.50
General Dynamics/fort Worth, Tex.
MANNED SPACECRAFT SYSTEMS COST MODEL, VOLUME I. CONDENSED SUMMARY REPORT, APR. 1965 - JUN. 1966.
by D. E. Wagner. 18 Jul 66, 28p NASA-CR-6445, FZM-4671-1, VOL. I
Contract NAS9-3954

Descriptors: *Cost estimate, *Mathematical model, *Nasa program, Computer, Cost, Development, Effectiveness, Estimate, Mathematics, Model, Program, Spacecraft, Subsystem.

For abstract, see STAR 04 19.

N66-33501 Field 22B
CFSTI Prices HC$3.00 MF$1.00
General Dynamics/fort Worth, Tex.
MANNED SPACECRAFT SYSTEMS COST MODEL, VOLUME III. TECHNICAL REPORT, APR. 1965 - JUN. 1966.
by D. E. Wagner. 18 Jul 66, 139p NASA-CR-65447, FZM-4671-3, VOL. III
Contract NAS9-3954

Descriptors: *Cost estimate, *Manned spacecraft, *Mathematical model, Application, Cost, Estimate, Input, Manned, Mathematics, Model, Output, Spacecraft, Structure, Subroutine, System.

For abstract, see STAR 04 19.

N66-33540 Field 22B
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Wallops Station, Wallops Island, Va.
DEVELOPMENT OF A SMALL ANIMAL PAYLOAD AND INTEGRATION WITH A SOUNDING ROCKET.
by L. J. Early. 1966, 110p NASA-SP-109

Descriptors: *Payload, *Sounding rocket, *Space flight, Animal, Arcas rocket, Configuration, Design, Flight, Integration, Launch, Research, Rocket, Sounding, Space, Test.

For abstract, see STAR 04 19.

N66-33694 Field 22B
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration, Washington, D. C.
IN OPEN SPACE -- VOSKHOD-2 SPACE CRAFT DESIGN.
V Otkrytom Kosmose -- Ustroystvo Korablya "voskhod-2"
by D. Viktorov. Jun 66, 14p NASA-TT-F-10216
Transl. Into English From Aviats. I Kosmonavt. (Moscow), V. 48, 1965 P 17-19

Descriptors: *Extravehicular operation, *Spacecraft design, *Voskhod ii spacecraft, Cabin, Construction, Control, Design, Distance, Instrumentation, Manned, Manual, Maximum, Movement, Operation, Pressurization, Spacecraft, Temperature.

For abstract, see STAR 04 19.

N66-33718 Field 22B
CFSTI Prices HC$6.12 MF$6.54
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
MARINER MARS 1964 PROJECT REPORT - MISSION AND SPACECRAFT DEVELOPMENT. VOLUME - I- APPENDIXES.
1 Mar 65, 562p NASA-CR-77110, JPL-TR-32-740
Contract NAS7-100

Descriptors: *Mariner program, *Mission planning, *Spacecraft design, Control, Design, Development, Management, Mars, Mars project, Mission, Monitor, Planning, Project, Spacecraft, System.

For abstract, see STAR 04 19.

N66-34070 Field 22B
CFSTI Prices HC$2.00 MF$0.50
Oklahoma State Univ., Stillwater. School Of Mechanical Engineering.
RESEARCH ON A SELF-TEMPERATURE REGULATING SPACECRAFT SKIN SYSTEM PROGRESS REPORT, DEC. 1, 1965 - MAY 31, 1966.
by J. A. Wiebelt. Jun 66, 26p NASA-CR-77101
Grant NSG-454

Descriptors: *Skin temperature, *Solar simulation, *Space environment, *Temperature control, *Thermostat, Bimetallic, Control, Environment, Fin, Radiation, Simulation, Skin, Solar, Space, Spacecraft, Surface, Temperature.

For abstract, see STAR 04 19.

N66-37642 Field 22B
CFSTI Prices HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
GROUND TEST SIMULATION OF LIFT-OFF AND TRANSONIC VIBRATION EXCITATION MECHANISMS ON THE RANGER SPACECRAFT.
by M. C. Trummel. 1 Nov 65, 18p NASA-CR-78431, JPL-TM-33-256
Contract NAS7-100

Descriptors: *Acoustic simulation, *Ground test, *Ranger lunar landing vehicle, *Vibration measurement, Band, Excitation, Flight, Frequency, Launch, Pressure, Transonic.

For abstract, see STAR 04 23.

N66-37801 Field 22B, 5B
Advisory Group For Aerospace Research And Development, Paris (France).

INDEX TO AGARD PUBLICATIONS 1952 - 1963, SUPPLEMENT NUMBER ONE.
by J. C. Dunne, and A. G. Vannucci. 1964, 167p

Descriptors: *Aerospace technology, *Bibliography, Author, Combustion, Document, Flow, Index, Literature, Radiation, Subject, Supersonic, Transfer.

For abstract, see STAR 04 23.

N66-38495 **Field 22B**
CFSTI Prices HC$3.75 MF$1.50
Lockheed Missiles And Space Co., Sunnyvale, Calif.
STUDY TO DEFINE AGENA VIBRATION AND ACOUSTIC ENVIRONMENT.
by A. D. Houston. 17 Aug 66, 258p NASA-CR-66196, LMSC-A824787
Contract NAS1-5150

Descriptors: *Acoustic excitation, *Agena rocket, *Random vibration, Acoustic, Atlas launch vehicle, Boost, Booster, Bracket, Environment, Geometry, Mounting, Orbital, Payload, Shroud, Sinusoid, Thor launch vehicle, Transducer.

For abstract, see STAR 04 23.

N66-38501 **Field 22B**
CFSTI Prices HC$3.00 MF$0.75
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
RANGER BLOCK III ATTITUDE CONTROL SYSTEM - MANUFACTURING, TESTING, AND PERFORMANCE.
by T. A. Almaguer Jr, T. G. Baxter, P. J. Hand, G. S. Perkins, and R. H. Summers. 15 Sep 66, 114p NASA-CR-78549, JPL-TR-32-915
Contract NAS7-100

Descriptors: *Attitude control, *Manufacturing, *Performance characteristics, *Ranger block iii, *Test program, Component, Configuration, Design, Fabrication, Flight, Interface, Mission, Operational, Requirement, Subsystem, System.

For abstract, see STAR 04 23.

N66-38506 **Field 22B**
CFSTI Prices HC$2.50 MF$0.75
Jet Propulsion Lab., Calif. Inst. Of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-40, VOLUME VI FOR THE PERIOD MAY 1 TO JUNE 30, 1966. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
31 Jul 66, 60p NASA-CR-78552, JPL-SPS-37-40, VOL. VI
Contract NAS7-100

Descriptors: *Deep space instrumentation facility (dsif), *Mariner program, *Space exploration, *Surveyor project, *Voyager project, Automation, Data, Detector, Encounter, Environment, Instrument, Lunar, Magnetic, Magnetometer, Nasa program, Occultation, Planetary, Radiation, Radio, Recording, Science, Seismometer, Sequence, Signal, Space, System, Tape, Testing, Video.

For abstract, see STAR 04 23.

PB-173 486 **Field 22B**
CFSTI Prices: HC$4.00 MF$0.75
National Environmental Satellite Center, Washington, D. C.
NEEDS FOR ENVIRONMENTAL SATELLITES,
by Mary Ann Ruzecki. 15 Jun 66, 118p

Descriptors: (*Scientific satellites, Manned), (*Environment, Scientific research), Earth (Planet), Specifications, Atmosphere, Oceanology, Geodesics, Meteorology.

Identifiers: Manned Orbiting Laboratories, ESSA satellite.

Problems associated with defining and obtaining satellite requirements are discussed. The results of questionnaires circulated thru ESSA are shown in matrix form. Sample questionnaires used by the ESSA Buoy Task Group, the manned orbiting laboratory study project and various government agencies are included. Requirements are categorized into nine different groups to facilitate their information for various uses. It is noted that requirements in this document, when used for official purposes, must be classified according to their intended use either as Production, Development, or Research type following official ESSA standards. (Author)

AD-455 328 **See Field 11G**

AD-458 414 **See Field 11H**

AD-641 434 **See Field 20D**

AD-641 501 **See Field 17B**

N66-33523 **See Field 4A**

22C. SPACECRAFT TRAJECTORIES AND REENTRY

AD-443 216 **Field 22C**
CFSTI Price: HC$3.60
Royal Aircraft Establishment, Farnborough (England).
THE RAPID COMPUTATION OF EARTH-SATELLITE EPHEMERIDES BY A METHOD USING FOURIER SERIES,
by R. J. Tayler. Mar 64, 31p Technical note TN-Space-61
N64-22499

Descriptors: (*Position finding, Satellites (Artificial)), (*Orbital trajectories, Fourier analysis), Series, Celestial mechanics, Programming (Computers), Mathematical analysis.

Feasibility of expressing earth-satellite positions as Fourier series is studied with a view to computing ephemerides more rapidly than by direct calculation from orbital parameters. The method is found to give sufficiently accurate ephemerides subject to certain limitations, which are discussed. The main features of the direct, the interpolation and the Fourier methods of calculating satellite positions are compared. (Author)

AD-641 404 **Field 22C, 17G**
CFSTI Prices: HC$1.00 MF$0.50
Cruft Lab., Harvard Univ., Cambridge, Mass.
NONLINEAR FEEDBACK SOLUTION FOR MINIMUM-TIME INJECTION INTO CIRCULAR ORBIT WITH CONSTANT THRUST ACCELERATION MAGNITUDE.
Technical rept.,
by David H. Winfield, and Arthur E. Bryson, Jr.
Jul 66, 25p TR-507
Contract Nonr-1866 (16)
Proj. NR-372-012

Descriptors: (*Rocket trajectories, *Circular orbit trajectories), Time studies, Maneuverability, Thrust, Dynamic programming, Feedback, Injection guidance.

The instantaneous thrust-direction for a rocket vehicle to perform a minimum-time injection into a circular orbit of prescribed radius is determined as a function of instantaneous distance, and radial and tangential velocity relative to the attracting center. A nonlinear feedback control law for the instantaneous thrust-direction is derived which is based on the approximation that the gravity vector and the vehicle thrust acceleration magnitude during the maneuver are to be constant at values intermediate between their present and expected terminal values. The control law is shown to depend only on two dimensionless functions of the three relevant state variables, so that the solution is, in effect, expressed in a reduced state space of two dimensions. The optimal thrust-direction is defined analytically and graphically as a function on the reduced state space. The open-loop solution to the minimum-time transfer problem is the well-known linear tangent law. The new contributions are (1) showing that the solution depends on only two dimensionless functions of state and (2) putting the solution in the form of a feedback law which depends on these two functions. For a maneuver spanning a considerable arc around the attracting center (up to about 40 degrees), the solution may be used directly as a suboptimal control or to give starting values for an iterative solution of true inverse-square gravity problem. (Author)

AD-641 865 **Field 22C, 12B**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
ON OPTIMIZING A TRAJECTORY TAKING INTO ACCOUNT THE MOTION ABOUT THE CENTER OF MASS,
by M. K. Takabaev. 29 Jul 66, 14p ATD-66-91 TT-66-62589
Ob Optimizatsii Traektorri S Uchetom Dvizheniya Vokrug Tsentra Mass, trans. from Leningrad Univ. Vestnik (USSR), v20 n7 Seriya Matematiki, Makhaniki i Astronomii, n2 1965. Trans. of Foreign Scientific and Technical Literature.

Descriptors: (*Optimization, *Trajectories), Center of mass, Thrust, Propulsion, Aerodynamic characteristics, Equations of motion, Calculus of variations, USSR.

In previous works dealing with the problem of the optimal programming of thrust for various aircraft the aircraft is regarded as a point of variable mass, i.e., it is considered only as the motion of the center of mass. The present work deals with the problem of the optimum programming of power plant thrust for the linear motion of a variable mass body in a resisting medium. It is assumed that the body is in oscillatory motion around the center of mass under the effect of aerodynamic moments. Using the results of certain works cited in the bibliography all necessary conditions are derived and the uniqueness of optimal thrust is proven. (Author)

N66-32759 **Field 22C**
CFSTI Prices HC$2.00 MF$0.50
Operations Research, Inc., Santa Monica, Calif.
OPTIMUM SECONDARY IMPULSE FOR INTERPLANETARY TRANSFER TECHNICAL NOTE 64-21.
by P. R. Escobal. 1 Jul 64, 45p NASA-CR-76990
Contract NAS8-5321

Descriptors: *Interplanetary transfer, *Mathematical model, *Orbital velocity, *Trajectory optimization, *Transfer vehicle, Analysis, Cone, Impulse, Interplanetary, Mathematics, Model, Optimization, Orbit, Patch, Theory, Trajectory, Transfer, Two, Vehicle, Velocity.

For abstract, see STAR 04 19.

N66-33016 **Field 22C**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
DETERMINATION OF ORBIT OF A SPACECRAFT WITH RESPECT TO AN OBJECT IN A KNOWN CIRCULAR ORBIT.
by R. S. Dunning. Aug 66, 47p NASA-TN-D-3518

Descriptors: *Coordinate system, *Cylindrical shell, *Differential equation, *Motion equation, *Spacecraft orbit, Body, Circular,

Coordinate, Cylinder, Differential, Equation, Motion, Orbit, Planetocentric, Prediction, Shell, Solution, Spacecraft, System.

For abstract, see STAR 04 19.

N66-33337 **Field 22C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
STABILITY AND CONTROL CHARACTERISTICS AT A MACH NUMBER OF 1.89 OF A LIGHTWEIGHT GLIDER REENTRY CONFIGURATION.
by R. B. Robinson, and M. L. Spearman. May 66, 25p NASA-TM-X-276

Descriptors: *Diamond wing, *Reentry glider, *Stability and control, *Supersonic speed, *Wing planform, Aerodynamics, Angle of attack, Configuration, Control, Diamond, Drag, Fin, Fuselage, Glider, Lateral, Lightweight, Longitudinal, Planform, Pressure, Ratio, Reentry, Stability, Supersonic, Tunnel, Twin, Vehicle, Ventral, Wing.

For abstract, see STAR 04 19.

N66-33503 **Field 22C**
CFSTI Prices HC$3.00 MF$0.75
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ORBITAL PREDICTION AND DIFFERENTIAL CORRECTION USING VINTI'S SPHEROIDAL THEORY FOR ARTIFICIAL SATELLITES.
by H. Walden. May 66, 102p NASA-TM-X-55550, X-543-66-263

Descriptors: *Orbit calculation, *Satellite orbit, Algorithm, Calculation, Correction, Differential, Oblateness, Orbit, Orbital, Planet, Prediction, Satellite, Spheroid.

For abstract, see STAR 04 19.

N66-33864 **Field 22C**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOLUME 6, NO. 14.
31 Jul 66, 32p NASA-TM-X-57833

Descriptors: *Earth orbit, *Satellite, *Table, Apogee, Date, Earth, Earth satellite, Inclination, Launch, Orbit, Perigee, Period, Source.

For abstract, see STAR 04 19.

N66-33966 **Field 22C**
CFSTI Prices HC$1.00 MF$0.50
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COMPUTATIONAL PROCEDURE FOR VINTI'S ACCURATE REFERENCE ORBIT WITH INCLUSION OF THE THIRD ZONAL HARMONIC.
by N. L. Bonavito. Aug 66, 20p NASA-TN-D-3562

Descriptors: *Orbit calculation, *Vinti theory, *Zonal harmonics, Calculation, Constant, Coordinate, Gravity, Harmonics, Mathematics, Orbit, Position, Potential, Procedure, Reference, Satellite, Velocity, Zone.

For abstract, see STAR 04 19.

N66-33968 **Field 22C**
CFSTI Prices HC$2.50 MF$0.75
National Aeronautics And Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE DRIFT OF AN INCLINED-ORBIT 24-HOUR SATELLITE IN AN EARTH GRAVITY FIELD THROUGH FOURTH ORDER.
by C. A. Wagner. Aug 66, 73p NASA-TN-D-3316

Descriptors: *Drift, *Gravitational field, *Orbit calculation, *Satellite orbit, Calculation, Earth, Field, Fourth, Gravity, Harmonic, Inclination, Longitude, Orbit, Order, Satellite.

For abstract, see STAR 04 19.

N66-33979 **Field 22C**
CFSTI Prices HC$2.00 MF$0.50
Martin Co., Baltimore, Md.
STUDY OF LOCAL FLOW CONDITIONS OVER A HEMISPHERICALLY BLUNTED 25 DEG CONE FOR A SHALLOW RE-ENTRY TRAJECTORY.
by W. H. Eilertson, and L. D. Wing. Jan 66, 29p NASA-CR-66046
Contract NAS1-5253

Descriptors: *Aerodynamic heating, *Blunt body, *Cone, *Reentry trajectory, Aerodynamic, Analysis, Axisymmetry, Condition, Density, Enthalpy, Flow, Graph, Heating, History, Pressure, Reentry, Shallow, Stress, Temperature, Theory, Trajectory.

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N66-37682 **Field 22C**
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National Aeronautics And Space Administration. Ames Research Center, Moffett Field, Calif.
A SUPERCIRCULAR ENTRY GUIDANCE CONCEPT DESIGNED FOR MAXIMUM MONITORING CAPABILITY.
by C. D. Havill, G. W. Stinnett, and K. C. White. Oct 66, 40p NASA-TN-D-3668
Contract 125-17-05-02

Descriptors: *Guidance system, *Range control, *Reentry vehicle, Automatic, Capability, Computer, Design, Manual, Monitor, Performance, Pilot, Simulation.

For abstract, see STAR 04 23.

22D. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

N66-32794 **Field 22D**
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National Aeronautics And Space Administration. Marshall Space Flight Center, Huntsville, Ala.
RANGE SAFETY DATA FOR SATURN SA-10.
by E. L. Leonard, and G. W. Solmon. 17 Jun 65, 100p NASA-TM-X-57806
Its Range Safety Data Rept.-4-65

Descriptors: *Range safety, *Reliability, *Saturn i (sa-10) Launch vehicle, *Saturn s- iv stage, Booster, Escape, Impact, Injury, Land, Launch, Range, Rate, Safety, Stage, System, Trajectory, Turn, Vacuum.

For abstract, see STAR 04 19.

N66-33345 **Field 22D**
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National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
PRELIMINARY INVESTIGATION OF INTERFERENCE EFFECTS OF MULTICOPLANAR FINS ON A TWO-STAGE ROCKET LAUNCH VEHICLE WITH WINGED SPACECRAFT AT TRANSONIC SPEEDS.
by P. K. Pierpont. Apr 62, 28p NASA-TM-X-677

Descriptors: *Aerodynamic characteristics, *Fin, *Launch vehicle, *Stability and control, *Transonic speed, *Two-stage rocket, *Winged vehicle, Aerodynamic, Angle of attack, Axial, Characteristics, Control, Coplanar, Force, Pressure, Reynolds number, Rocket, Sideslip, Spacecraft, Speed, Stability, Stage, Test, Transonic, Tunnel, Two, Vehicle, Wing.

For abstract, see STAR 04 19.

N66-33450 **Field 22D**
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National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
DYNAMIC-MODEL INVESTIGATION OF SOME LANDINGS AND SLIDEOUTS OF A RECOVERABLE BOOSTER.
by W. C. Thompson. Aug 66, 23p NASA-TN-D-3413
Film Supplement Number L-901 To This Report Is Available On Loan From Nasa Langley Research Center, Langley Station Va.

Descriptors: *Booster recovery, *Landing system, *Launch vehicle, *Stability test, Acceleration, Coefficient, Four, Friction, Gear, Impact, Landing, Recovery, Reuse, Saturn, Saturn i launch vehicle, Skid, Speed, System, Test, Touchdown.

For abstract, see STAR 04 19.

N66-33865 **Field 22D**
CFSTI Prices HC$7.00 MF$1.75
National Aeronautics And Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
ELECTRICAL REFERENCE HANDBOOK, LAUNCH EQUIPMENT BRANCH ELECTRICAL SUPPORT EQUIPMENT LC-39, VOLUME I.
1 Nov 65, 371p NASA-TM-X-57822, SP-166-D Revised

Descriptors: *Electric equipment, *Handbook, *Launch complex, *Support system, Arm, Charge, Command, Complex, Control, Distribution, Electric, Engine, Equipment, Hydraulic, Launch, Module, Monitor, Panel, Platform, Pneumatic, Service, Subsystem, Support, System, Test.

For abstract, see STAR 04 19.

N66-38140 **Field 22D**
CFSTI Prices HC$2.00 MF$0.50
National Aeronautics And Space Administration. Langley Research Center, Langley Station, Va.
AN EXPERIMENTAL AND ANALYTICAL STUDY OF THE LONGITUDINAL VIBRATION OF A SIMPLIFIED THOR VEHICLE STRUCTURE.
by H. D. Carden, and J. P. Raney. Oct 66, 45p NASA-TN-D-3632

Descriptors: *Frequency response, *Mode of vibration, *Thor launch vehicle, *Vibration measurement, Acoustic, Boundary, Computation, Damping, Dynamic, Free-free, Frequency, Longitudinal, Measurement, Mode, Model, Resonance, Response, Structural, Tank, Vibration.

For abstract, see STAR 04 23.

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THE ELECTROLYTIC OXIDATION OF ORGANIC ANIONS IN NON-AQUEOUS SOLVENTS

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GSB 4245 2 FIELD 7C, 7D,20J

GEOMETRICALLY DETERMINED CHEMICAL REACTIONS

M. LEVY

NSF-GB-4134
9/65- 9/66

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GSE 111 3 FIELD 7C, 7D,20M,11G

GAS AND VAPOR TRANSMISSION THROUGH POLYMER FILMS

A. S. MICHAELS, H. J. BIXLER

NSF-GP-1838
7/64- 7/65

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GSE 375 2 FIELD 7C, 7D,20M,20D

VISCOSITY AND THERMAL CONDUCTIVITY OF HYDROCARBONS AND THEIR MIXTURES

B. H. SAGE

NSF-GK-715
12/65-12/66

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QH 225 FIELD 7C, 7D, 7A

ELECTRON SPIN RESONANCE SPECTROSCOPY OF PARAMAGNETIC SPECIES DERIVABLE FROM TOBACCO AND RELATED SYSTEMS

J. S. WAUGH

448R1
12/65-11/66

COUNCIL FOR TOBACCO RES

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NG 91 FIELD 7C, 7D, 7A, 9+

KINETIC STUDIES OF RAPID CHEMICAL REACTIONS WITH DERIVATIVE VOLTAMMETRY

S. P. PERONE, H. STAPELFELDT

6/65- 5/66

PURDUE UNIVERSITY

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NG 98 FIELD 7C, 7A, 7D,20J

OLEFIN ALDEHYDE CONDENSATIONS

J. WOLINSKY, R. HUTCHINS

6/65- 6/66

PURDUE UNIVERSITY

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PCS 465 FIELD 7C, 7D

THE SYNTHESIS AND REACTIVITY OF SOME BICYCLONENES

R. E. WINTER

605-G1
9/65- 8/66

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PCS 493 FIELD 7C, 7A, 7D,20J

ENOLATES OF UNSYMMETRICAL KETONES

D. S. CAINE

1/66-12/66

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PCS 497 FIELD 7C, 7D,20J, 7B

GROUP IV ANALOGS OF ANALOGS OF ETHYL COMPOUNDS

A. G. MACDIARMID

2/66- 8/67

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PCS 498 FIELD 7C, 7A, 7D,20M

THERMODYNAMICS OF NON-POLAR MIXTURES

J. D. GOMEZIBANEZ

2/66- 8/67

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PCS 501 FIELD 7C, 7D,20J, 7H

ARYNES, CARBENES AND NITRENES

C. W. REES

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PCS 505 FIELD 7C, 7A, 7D

THE VINYLCYCLOPROPANE REARRANGEMENT

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TES 912 FIELD 7C, 7D

FURTHER RESEARCHES IN CHEMISTRY AND RELATED SCIENCES

L. PAULING, L. O. PAULING

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UT 529 FIELD 7C

THE CHEMISTRY OF NATURAL PRODUCTS

J. A. DEYRUP

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UT 540 FIELD 7C, 7B

A STUDY OF THE FACTORS RESPONSIBLE FOR SECONDARY HYDROGEN ISOTOPE EFFECTS

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UT 542 FIELD 7C, 7A, 7D,20J

OPTICAL ACTIVITY IN HETEROCYCLIC SYSTEMS

D. A. LIGHTNER

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UT 546 FIELD 7C

THE CHEMISTRY OF AMINO RADICALS

C. J. MICHEJDA

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UT 550 FIELD 7C, 7D,20J, 7B

INVESTIGATION OF CERTAIN HYDROXYCOUMARIN DERIVATIVES AS FLUOROMETRIC METAL ION REAGENTS

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UT 565 FIELD 7C, 7D

THE PREPARATION AND CHEMISTRY OF SOME HINDERED DIVINYL ETHERS

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9/65- 8/66

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ZBA 2130 1 FIELD 7C, 7D,20F,20L

STANDARD X-RAY DIFFRACTION PATTERNS FOR CHEMICAL ANALYSIS

H. E. SWANSON

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COMMERCE-NATIONAL BUREAU OF STANDARDS

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ZPE 1488 FIELD 7C, 7D, 7A, 7B

RE-PAIRING OF LONG-LIVED FREE RADICALS

M. L. RANDOLPH, M. G. MILLER

W-7405-ENG-26
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AEC-BIOLOGY + MEDICINE

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ZPE 1714 FIELD 7C, 7D, 7B

INTERACTION OF RADIATION WITH GASES

G. S. HURST, T. E. BORTNER
L. G. CHRISTOPHOROU, R. N. COMPTON
F. J. DAVIS, C. E. KLOTS, P. W. REINHAARDT

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AEC-BIOLOGY + MEDICINE

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ZQA 15 FIELD 7C, 7D,20M,11B

REACTIONS OF POTENTIALLY SUITABLE VCI WITH NON-FERROUS METALS AND NON-METALS

P. MARTIN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQA 137 1 FIELD 13B, 7C, 7D, 8D

RADIOCHEMISTRY RESEARCH

C. CRISCO, J. BOGDAN, H. LADA

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZT 130 FIELD 7C, 7D, 7B

HIGH-TEMPERATURE ACTIVATION OF CHEMICAL REACTIONS

E. P. EGAN

813403
/66-

TENNESSEE VALLEY AUTHORITY

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ZVA 128 FIELD 7C, 7D

DETERMINATION OF INTERMEDIATES IN D+C RED NO. 21 AND D+C RED NO. 22

C. GRAICHEN, K. A. FREEMAN, N. H. WATKINS

FDA-V-011-02
/65- /

HEW-FOOD + DRUG ADMINISTRATION

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ZVA 152 FIELD 7C, 7D

PREPARATION OF 4 - 2-CHLORO-4-NITROPHENYLAZO - -1-NAPHTHOL

C. GRAICHEN, P. BULHACK, K. A. FREEMAN

FDA-V-019-01
/66- /

HEW-FOOD + DRUG ADMINISTRATION

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ZVA 153 FIELD 7C, 7D

DETERMINATION OF 2,4,6-TRIBROMORESORCINOL IN D+C RED NO. 27

C. GRAICHEN, K. A. FREEMAN, N. H. WATKINS

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HEW-FOOD + DRUG ADMINISTRATION

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ZVA 236 FIELD 7C, 7D

DETERMINATION OF SUBSIDIARY DYES IN D+C ORANGE NO. 17

C. GRAICHEN, P. BULHACK, K. A. FREEMAN

FDA-V-020-02
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HEW-FOOD + DRUG ADMINISTRATION

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ZVA 237 FIELD 7C, 7D

PREPARATION OF 4 - 2,4-DINITROPHENYLAZO - -1-NAPHTHOL

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ZVA 249 FIELD 7C, 7D

INTERMEDIATES IN D+C VIOLET NO. 2

W. LINK, C. STEIN

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ZVA 274 FIELD 7C, 7D

CHROMATOGRAPHIC SEPARATION OF COSMETIC INGREDIENTS

S. H. NEWBURGER, H. M. DAVIS
W. STEVENSON

FDA-2-1001-IIIA
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HEW-FOOD + DRUG ADMINISTRATI

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ZVA 275 FIELD 7C, 7D

ANALYSIS OF ARYLAMINE OXIDATION HAIR DYES

S. H. NEWBURGER, A. ANDREWES
C. KOTTEMANN

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ZVA 276 FIELD 7C, 7D,12A

PERFUMES, FLAVORS, AND THEIR INGREDIENTS

M. OOLINSKY, J. WENNINGER, R. YATES

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/65- /

HEW-FOOD + DRUG ADMINISTRATION

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ZVA 286 FIELD 7C, 7D, 7E

PURIFICATION AND SYNTHESIS OF MODEL ORGANIC COMPOUNDS

E. P. RAGELIS, N. DUY, E. O. HAENNI
J. W. HOWARD, E. LUSTIG

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ZVA 450 FIELD 7C, 7D, 7B

SEPARATION OF SYNTHETIC ORGANIC COLORS IN NAIL POLISHES AND ROUGES BY THIN LAYER CHROMATOGRAPHY

C. GRAICHEN, K. A. FREEMAN
A. L. MARCOTTE, W. S. MARIS
N. H. WATKINS

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/65- /

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ZVA 451 FIELD 7C, 7D

DETERMINATION OF INTERMEDIATES IN D+C RED NO. 21 + D+C RED NO. 22

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W. MARIS

FDA-V-311-01
/65- /

HEW-FOOD + DRUG ADMINISTRATION

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ZVA 452 FIELD 7C, 7D

DETERMINATION OF INTERMEDIATES IN ORANGE B

C. GRAICHEN, K. A. FREEMAN, H. YOUNG

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/65- /

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ZVA 21139 FIELD 7C, 7D,11H,11G

SYNTHETIC LUBRICANTS FROM HETEROCYCLIC DERIVATIVES OF ANIMAL FATS

G. MAERKER

AG-E06-03-083
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AGRICULTURE-DEPT OF AGRICULTURE

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ZVA 32237 FIELD 7C, 7D, 7B

CHEMICALS FROM TERPENES AND RESIN ACIDS BY FREE RADICAL ADDITION

G. S. FISHER

AG-S05-02-057
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AGRICULTURE-DEPT OF AGRICULTURE

D. Physical chemistry

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GPF 35 3 FIELD 7D,20J,20F,20D

UNIV OF KENTUCKY, GRADUATE SCHOOL, CHEMISTRY, KENTUCKY

INFRARED STUDIES OF CHEMISORBED MOLECULES

H. C. ECKSTROM

AT(40-1)2948
12/65-12/66

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GSP 2517 FIELD 7D, 8G, 7B

CONSTRUCTION OF A MASS SPECTROMETER FOR POTASSIUM-ARGON ANALYSIS

H. FAUL, H. +. FAUL

NSF-GP-4170
2/65- 2/66

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PCS 435 FIELD 7D,20J,20L, 7B

THE INTERACTION OF HYDROGEN AND DEUTERIUM MOLECULAR BEAMS WITH ATOMICALLY CLEAN METAL SURFACES

R. P. MERRILL

600-G2
9/65- 8/66

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TES 928 FIELD 7D,20J, 7B

APPLICATION OF X-RAY DIFFRACTION TECHNIQUES TO STRUCTURAL PROBLEMS IN INORGANIC CHEMISTRY

R. SCHAEFER

4/65- 3/66

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UT 524 FIELD 7D,20J, 7B

VIBRATIONALLY INDUCED INTERACTIONS IN COPPER BETA-DIKETONATES

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UT 533 FIELD 7D,20M,20L, 7B

THE ABSORPTION OF GASES BYSOLID TRANSITION METAL COMPOUNDS

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ZVA 278 FIELD 7D, 7C, 7B

CLASSICAL CHEMICAL METHODS

K. S. HEINE, C. HOZDIC

FDA-2-3002-IIIA
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HEW-FOOD + DRUG ADMINISTRATION

08 EARTH SCIENCES AND OCEANOGRAPHY

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GOA 303 1 FIELD 20+, 9+, 9A, 5A

GEOPHYSICS - MEGAGAUSS FIELDS

F. BITTER, F. +. BITTER, G. FIOCCO

DA-36-039-AMC-03200E
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DOD-ARMY

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GSE 256 3 FIELD 13B

CONSTITUTIVE RELATIONS FOR SOILS

R. F. SCOTT

NSF-GK-626
9/65- 8/66

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GSE 1031 FIELD 13G,13B

THE EFFECT OF HIGH CONFINING PRESSURE ON THE DEFORMATION OF SOIL

K. L. LEE

GK-921
3/66- 2/67

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NG 109 FIELD 13B

FUNDAMENTAL CONCEPTS IN THE BEHAVIOR OF PARTLY SATURATED CLAYS

A. G. ALTSCHAEFFL

9/65- 9/66

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ZUG 812 FIELD 5A

PRESSURE RELEASE BY WASHER-HELD METAL-PANEL VENTS

J. W. CONN

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INTERIOR-BUREAU OF MINES

D. Geochemistry

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GH 406 2 FIELD 3A, 7D, 8D, 7B

UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

GEOCHEMISTRY OF TRACE ELEMENTS IN METEORITES

G. G. GOLES

NSG-319
9/64- 9/65

NASA

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GPF 382 3 FIELD 8D, 8G, 8C

MASS INST OF TECHNOL, GRADUATE SCHOOL, GEOLOGY + GEOPHYSICS, MASSACHUSETTS

VARIATIONS IN ISOTOPIC ABUNDANCES OF STRONTIUM, CALCIUM, AND ARGON AND RELATED TOPICS

P. M. HURLEY, H. W. FAIRBAIRN
W. H. PINSON

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4/65- 3/66

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SSB 4094 7 FIELD 8D, 8G

PALEONTOLOGY AND STRATIGRAPHY OF THE TERTIARY AMBER-BEARING BEDS OF CHIAPAS MEXICO

J. W. DURHAM, R. C. ALLISON

NSF-GB-1127
6/65- 6/66

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GSB 5022 FIELD 8D

QUATERNARY ENVIRONMENTS AND BIOTAS

C. L. HUBBS

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1/66- 1/67

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GUW 517 FIELD 8D, 8N, 8K, 8H

GEOLOGY OF THE REGOLITH AQUIFERS OF THE NISHNABOTNA BASIN

K. M. HUSSEY, L. V. SENDLEIN

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INTERIOR-OFFICE OF WATER RESOURCES

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GUW 529 FIELD 8D, 8H,12A, 8E

NUMERICAL MODELING OF GROUND-WATER FLOW

C. WEINAUG

INT-WR-A-002-KAN
6/65- 6/66

INTERIOR-OFFICE OF WATER RESOURCES

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ZUA 850 FIELD 7D,20M, 8D, 8H

SPRINGS OF UTAH

J. C. MUNDORFF

INT-GS-UTAH-8-C
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INTERIOR-GEOLOGICAL SURVEY

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ZUG 813 FIELD 8D

ROOF CONTROL AND SUPPORT LOADS ON PILLAR LINES

E. A. CURTH, R. H. DITTO

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INTERIOR-BUREAU OF MINES

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ZUG 819 FIELD 8D,20L

UNDERGROUND AIR CONDITIONING

E. J. HARRIS, F. F. KAPSCH, J. W. WARREN

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INTERIOR-BUREAU OF MINES

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ZUG 824 FIELD 8D

HIGH CAPACITY AUXILIARY EQUIPMENT IN FACE VENTILATION

W. KEBBLISH, R. W. DALZELL
J. W. STEVENSON

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INTERIOR-BUREAU OF MINES

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ZUG 827 FIELD 8D

EFFECT OF ANGULAR INSTALLATION ON MINE-ROOF BOLTS

J. A. MCCORMICK, J. B. SHUTACK

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INTERIOR-BUREAU OF MINES

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ZUG 828 FIELD 8D

RESIN ANCHORED ROOF BOLTS

J. A. MCCORMICK, J. B. SHUTACK
J. H. STEARS

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ZUG 830 FIELD 8D

EXPLOSIVE-ANCHORED BOLT

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INTERIOR-BUREAU OF MINES

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ZUG 831 FIELD 8D,20K

DEVELOPMENT OF A HYDRAULIC BOLT-TENSION INDICATOR

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INTERIOR-BUREAU OF MINES

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ZUG 834 FIELD 7C,21B, 8D,11C

FIRE HAZARD OF URETHANE FOAM IN MINES

D. W. MITCHELL, E. M. MURPHY

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INTERIOR-BUREAU OF MINES

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ZUG 835 FIELD 7C,21B, 8D,11G

FLAME SPREAD ON CONVEYOR BELTS

E. M. MURPHY

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INTERIOR-BUREAU OF MINES

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ZUG 849 FIELD 8D

ENGINEERING STUDIES OF STOPE FILL SYSTEMS

W. R. WAYMENT

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INTERIOR-BUREAU OF MINES

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ZUG 869 FIELD 7D, 8D, 8H, 7B

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

DETERMINATION, CORRELATION, AND INTERPRETATION OF ORGANIC CONSTITUENTS IN SUBSURFACE BRINES

A. G. COLLINS

INT-BM-6-1112-11AOC
/66- /

INTERIOR-BUREAU OF MINES

E. Geodesy

••••••••••

GQF 259272 FIELD 22C,12A, 8E

DEVELOP MATHEMATICAL STATISTICAL

TECHNIQUES FOR TROPOSPHERIC WIND PRESENTATION

NONE

AF-19-628-05170
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DOD-AIR FORCE

F. Geography

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GQF 258196 1 FIELD 13B, 8F, 8G

BOSTON COLLEGE, GRADUATE SCHOOL, GEOLOGY, MASSACHUSETTS

INTERPRET GEOLOGICAL PHENOMENA IN SATELLITE PHOTOGRAPHY

J. W. SKEHAN

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GQF 258720 2 FIELD 13B, 8F, 8H, 8G

UNIV OF MASSACHUSETTS, GRADUATE SCHOOL, GEOLOGY, MASSACHUSETTS

RSCH ON FORMATION DISTRIBUTION + PHYSICAL CHARAC OF DESERT TERRAIN ELEMENTS IN AFRICA + ARABIAN PENIN

W. S. MOTT

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/65- /

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GQF 259543 FIELD 13B, 8F, 8G

USA, CORPS ENGRS, VICKSBURG, MISSISSIPPI

INVES OF TERRAIN + SOIL PROPERTIES BY ELECTROMAGNETIC SENSOR INSTRUMENTATION-AIRBORNE MEAS OF PROP

S. J. KNIGHT

PRO-00805-66
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GEOMORPHIC INVESTIGATIONS OF LAND FORMS IN ARID REGIONS OF MEXICO REGIONS OF MEXICO + PERU

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GUW 513 FIELD 13B, 8F, 8H, 8G

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INFLUENCE OF GEOHYDROLOGY ON LANDSCAPE AND SOIL FORMATION

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GUW 515 FIELD 13G, 8F, 8H, 8G

LABORATORY INVESTIGATION OF FLOW IN RIVER BENDS

H. ROUSE, E. M. LOUGHLIN, C. YEN

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PX 353 FIELD 13B, 8F, 8H, 8G

MAPPING THE GLACIAL GEOLOGY OF DELAWARE COUNTY, INDIANA

H. E. KANE

2/66- 1/67

AMERICAN ASSOC FOR ADVAN OF SCIENCE

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ZUA 724 3 FIELD 8F, 8H, 8G

SOLUTE BALANCE AT ABERT AND SUMMER LAKES, SOUTH-CENTRAL OREGON

A. S. VANDENBURGH

PCA-15-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 740 2 FIELD 8F, 8G, 8H

MECHANICS OF AQUIFER SYSTEMS

J. F. POLAND

PCA-2-F
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 829 FIELD 8F, 8H, 8G

TECHNIQUES FOR APPRAISAL OF HYDROLOGIC PARAMETERS IN DESERT BASINS

T. E. EAKIN, D. O. MOORE, E. F. RUSH G. F. WORTS

INT-GS-NEV-24-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

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ZUA 848 FIELD 8F, 8H, 8G

DELAWARE ESTUARY SEDIMENTATION STUDY

D. W. MOODY

INT-GS-PA-35-D
/66- /

INTERIOR-GEOLOGICAL SURVEY

G. Geology and mineralogy

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GQF 258131 1 FIELD 8G, 8+, 9+

BARKLEY DEXTER LABS, FITCHBURG, MASSACHUSETTS

PROVIDE SERVICES RELATING TO NEW GRAVITY INSTRUMENTATION TO BE INSTALLED IN KC-135 AIRCRAFT

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EDGERTON GERMESHAUSE, N + GRIER, BOSTON, MASSACHUSETTS

FABRICATE LIGHTWEIGHT OPTICAL BEACON UNITS SUITABLE FOR USE AS BALLOON-BORNE GEODETIC TARGETS

F. GRONBERG

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GYE 360133 FIELD 13B, 8G

IDENTIFICATION AND CHARACTERIZATION OF CLAY MINERAL SPECIES IN SOILS OF THE WESTERN REGION

• NONE

AG-ORE-0769
7/65- 6/66

AGRICULTURE-DEPT OF AGRICULTURE

••••••••••

ZPE 1600 FIELD 13B, 8G,20D

EXCHANGE-DIFFUSION IN SOILS

G. E. SPALDING, R. G. GAST

AT(40-1)242
/66- /

AEC-BIOLOGY + MEDICINE

H. Hydrology and limnology

••••••••••

GSB 5151 FIELD 8H

SUPPORT OF RESEARCH VESSELS FOR RESEARCH IN THE MARINE SCIENCES

P. M. FYE

GB-286
2/66- 2/67

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

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GSB 5153 FIELD 8H

OREGON OCEANOGRAPHIC STUDIES

W. V. BURT

GB-295
2/66- 2/67

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

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GSB 5154 FIELD 8H

STUDENT RESEARCH TRAINING AT THE MARINE SCIENCE CENTER

J. W. HEDGPETH

GB-4792
2/66- 2/67

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

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GSB 5155 FIELD 8H

PARTIAL SUPPORT OF R/V TRIDENT

J. A. KNAUSS

GB-5654
2/66- 2/67

NSF-BIOLOGICAL + MEDICAL SCIENCES DIVISI

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GUW 417 1 FIELD 13G, 8H,12A, 8E

DETERMINATION OF FLOWS FOR UNGAGED STREAMS

D. L. BENDER, D. L. SCHREIBER

A-009-WASH
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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GUW 516 FIELD 13B, 8H, 8G, 5A

MOVEMENT OF RADIONUCLIDES THROUGH SOIL FORMATIONS

C. S. OULMAN, L. V. SENDLEIN, H. D. VOSS

INT-WR-A-011-IA
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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YIN 158 1 FIELD 13G,13F, 8H

HYDROLOGY OF SMALL WATERSHEDS IN INDIANA

J. W. DELLEUR

/65- /

STATE-INDIANA

****

YNM 78 1 FIELD 8H

BANK STORAGE OWING TO FLOOD STAGES IN SURFACE STREAMS

H. S. HANTUSH

/65- /

STATE-NEW MEXICO

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YNM 79 1 FIELD 13G, 8H

HYDRAULICS OF WELLS

H. S. HANTUSH

/65- /

STATE-NEW MEXICO

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YNM 81 1 FIELD 8H

EXPERIMENTAL VERIFICATION OF THEORETICAL SOLUTIONS FOR SEVERAL GROUND-WATER FLOW PROBLEMS

H. S. HANTUSH

/65- /

STATE-NEW MEXICO

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ZUA 845 FIELD 8H,12A

PEAK RUNOFF MEASUREMENT BY DIGITAL-RECORDING POND GAGES

J. E. MCCALL

INT-GS-NJ-34-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

N. Terrestrial magnetism

****

GH 1422 FIELD 8N, 4A,12A, 5A

TASMANIAN DEPT OF HLTH, AUSTRALIA

A STUDY OF THE GEOGRAPHICAL DISTRIBUTION OF GEOMAGNETIC MICROPULSATIONS

R. W. MCNICOL, J. S. MAINSTONE
H. C. WEBSTER

NASA-NGR-52-039-002
10/64- 9/65

NASA

09 ELECTRONICS AND ELECTRICAL ENGINEERING

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GPF 488 3 FIELD 12A

RICE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, TEXAS

RICE UNIVERSITY COMPUTER PROJECT

M. GRAHAM, J. JODEIT, W. ORVEDAHL
S. RUSK, Z. SALSBURG, K. WATSON

AT-40-1-2572
10/65- 9/66

AEC-DIVISION OF PHYSICAL RES

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GSE 934 FIELD 13+, 9+,12A,18A

PERIPHERAL EQUIPMENT FOR A SMALL DIGITAL COMPUTER

R. E. UHRIG

GK-677
11/65-10/66

NSF-ENGINEERING SCIENCES DIVISION

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GSE 959 FIELD 9+, 9C, 9A

LOW-ENERGY SPREAD ELECTRON BEAMS

E. M. BOONE

GK-800
2/66- 1/67

NSF-ENGINEERING SCIENCES DIVISION

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ZKD 444 FIELD 1E,12A,22C

DEVELOPMENT OF ADVANCED TECHNIQUES FOR COMPUTER DIAGNOSTICS

K. J. COHEN

FAA-120-233
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

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ZKD 451 FIELD 1E,22C,12A, 5C

ADVANCED DATA ACQUISITION

P. J. LAROCHELLE

FAA-241-003
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

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ZQF 260554 FIELD 9+, 9A,12A, 9D

DYNAMIC DATA PROCESSING METHODOLOGY

C. M. WALTER

/65- /

DOD-AIR FORCE

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ZQN 544181 5 FIELD 15+, 9+, 9C, 9A

LOSSY COATINGS FOR ELECTRICAL TRANSMISSION LINES TO ATTENUATE EMI RADIATION

D. B. CLARK, W. D. PLUM

/65- /

DOD-NAVY

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ZT 165 FIELD 9+, 9C

TIE LINE TRIPPING

C. MCCORD, J. A. BRADLEY

/66- /

TENNESSEE VALLEY AUTHORITY

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ZT 166 FIELD 9+, 9C, 9A

RELAYING FOR SINGLE-POLE RECLOSING ON EHV LINES

C. MCCORD, J. A. BRADLEY

/66- /

TENNESSEE VALLEY AUTHORITY

C. Electronic and electrical engineering

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ZT 137 FIELD 13G, 9C,10B

ECONOMIC DISPATCH

J. H. GILBREATH

/66- /

TENNESSEE VALLEY AUTHORITY

10 ENERGY CONVERSION (NON-PROPULSIVE)

•••••••••

GSE 943 FIELD 20M, 9C,20D,20K

FUNDAMENTAL STUDIES OF SOLAR-THERMAL CONVERSION METHODS

D. BUCHBERG, D. K. EDWARDS

GK-799
2/66- 1/67

NSF-ENGINEERING SCIENCES DIVISION

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PAR 7 FIELD 9+, 9C, 9A,11B

APPLICATION OF GAS THERMIONICS

L. J. LAZARIDOS, L. A. SARKES

ZT-35
1/66-12/66

ASSOCIATION OF AMERICAN RAILROADS

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PAR 9 FIELD 7D,21D, 7A, 9C

DEVELOPMENT OF MOLTEN CARBONATE FUEL CELL

B. BAKER, L. SARKES

ZB-56
1/66-12/66

ASSOCIATION OF AMERICAN RAILROADS

B. Power sources

•••••••••

ZT 170 FIELD 10B

STEAM SURFACE CONDENSERS - STEAM PLANTS

J. R. PARRISH, R. H. DUNHAM

/66- /

TENNESSEE VALLEY AUTHORITY

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ZT 175 FIELD 20L,20D,10B

DRAFT SYSTEMS - STEAM PLANTS

J. R. PARRISH, R. E. LYON

/66- /

TENNESSEE VALLEY AUTHORITY

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ZT 176 FIELD 20D,10B

CIRCULATING WATER SYSTEMS - STEAM PLANTS

J. R. PARRISH, C. W. BOLIEAU
R. H. DUNHAM

/66- /

TENNESSEE VALLEY AUTHORITY

11 MATERIALS

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GQF 207381 2 FIELD 20M,20D,20L, 7B

SYS. RES. LAB. INC.,, OHIO

ELECTRICAL BEHAVIOR OF REFRACTORY MATERIALS

R. W. VEST

AF-33-615-02765
/65- /

DOD-AIR FORCE

•••••••••

GQF 284688 5 FIELD 7C, 7D, 7A,20M

UNIV OF UPPSALA, SWEDEN

THE EFFECT OF SHEAR RATES ON VISCOSITY OF POLYMER SOLUTIONS

S. CLAESSON

AF-61-052-00392
/65- /

DOD-AIR FORCE

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PCS 431 FIELD 7C, 7A, 7D

EFFECT OF ULTRAVIOLET RADIATION ON THE STRESS RELAXATION OF SULFUR-CONTAINING POLYMERS

W. J. MACKNIGHT

522-G2
9/65- 8/66

PETROLEUM RESEARCH FUND-AMER CHEM SOC

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YND 60 FIELD 7D,21D

A STUDY OF THE UTILIZATION OF BY-PRODUCTS FROM LIGNITIC CHAR PRODUCTION

P. JOHNSON, F. L. MINNEAR, D. SCHWARTZ

/66- /

STATE-NORTH DAKOTA

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ZQA 230 FIELD 7D, 7B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

INVESTIGATION OF IRREVERSIBLE DESICCANTS

W. GARLAND

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQF 260092 FIELD 13B,12A,20L

USAF, OAR, AFCRL, HANSCOM, BEDFORD, MASSACHUSETTS

MECHANICAL BEHAVIOR OF MATERIALS

D. W. KLICK

/65- /

DOD-AIR FORCE

•••••••••

ZQF 284498 4 FIELD 7C, 7A, 7D,20M

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

RESEARCH ON POLYMER DEGRADATION MECHANISMS

I. J. GOLDFARB

/65- /

DOD-AIR FORCE

•••••••••

ZT 101 2 FIELD 7C,21B, 7B

TENN VALLEY AUTHORITY, TENNESSEE

FIRE RETARDANT TREATMENT OF WOOD

M. R. SIEGEL

/66- /

TENNESSEE VALLEY AUTHORITY

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ZUG 798 FIELD 13H

SILVER METALLURGY RESEARCH

B. H. CLEMMONS, R. O. DANNENBERG
R. HAVENS, J. H. MAURICE, G. H. POTTER
G. A. SMYRES

INT-BM-111461-2
/66- /

INTERIOR-BUREAU OF MINES

A. Adhesives and seals

•••••••••

GQF 284669 2 FIELD 7C, 7D, 7A,11A

GENERAL ELECTRIC CORP, PHILADELPHIA, PENNSYLVANIA

CATALYTIC THERMAL OXIDATIVE DEGRADATION OF ORGANIC POLYMERS AT ELEVATED TEMPERATURES

C. A. GAULIN

AF-33-657-11240
/65- /

DOD-AIR FORCE

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ZQA 194 FIELD 11A,11F,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF A REMOVABLE FILM CORROSION PREVENTIVE FOR METAL SURFACES

W. GARLAND

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

B. Ceramics, refractories and glasses

•••••••••

GPF 741 4 FIELD 7D,20M,11B,11F

UNIV OF TENNESSEE, SCHOOL OF ENGINEERING, CHEMICAL + METAL ENGIN, TENNESSEE

APPLICATION OF ADIABATIC CALORIMETRY TO METAL SYSTEMS

E. E. STANSBURY, C. R. BROOKS

AT(40-1)-3291
9/65- 8/66

AEC-DIVISION OF PHYSICAL RES

•••••••••

GQA 550 FIELD 11B, 5A,11F,11G

MARTIN CO BALTIMORE, MARYLAND

CONFERENCE ON ENVIRONMENT SENSITIVE

MECHANICAL BEHAVIOR OF MATERIALS

A. R. WESTWOOD

/65- /

DOD-ARMY

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GQF 207514 FIELD 7D, 7A,20M,11B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

DIFFUSION MECHANISMS IN NON-METALLIC MATERIALS

K. RICHARDS

/65- /

DOD-AIR FORCE

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GQF 207515 FIELD 11B,11D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH ON CERAMIC AND METAL-CERAMIC SYSTEMS

R. RUH

/65- /

DOD-AIR FORCE

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GQF 207516 FIELD 11B,20L

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

PHASE EQUILIBRIA RESEARCH

T. ROCKETT

/65- /

DOD-AIR FORCE

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GQF 258374 2 FIELD 11B,11G,11C,11F

MANLABS INC CAMBRIDGE, MASSACHUSETTS

EXPER DETERMINATION OF CRYSTALLINITY + RELATED PARAMETERS OF THIN FILMS OF SUCH MATS AS BORON SIC

S. A. KULIN

AF-19-628-02438
/65- /

DOD-AIR FORCE

••••••••••

GQF 284691 4 FIELD 11B,11F,13H,11G

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, MICHIGAN

PLASTICITY AND BRITTLE BEHAVIOR OF DUCTILE BCC METALS

R. M. HAYTHORNTHWAITE

AF-33-615-01572
/65- /

DOD-AIR FORCE

••••••••••

ZQA 175 FIELD 20M,11B,11G,11D

THERMAL AND ELASTIC-PLASTIC STRESS IN COMPOSITE TUBES

J. ZWEIG

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZUG 792 FIELD 8D, 8G,11B, 5A

BENEFICIATION OF IDAHO KYANITE

A. H. ROBERSON, W. A. STICKNEY
G. V. SULLIVAN

INT-BM-111411-COMP-5
/66- /

INTERIOR-BUREAU OF MINES

••••••••••

ZUG 796 FIELD 7D,20M,11B,20L

HIGH TEMPERATURE MATERIALS OF CONSTRUCTION, THE SYSTEM A14C3-AIN-A1203

A. H. ROBERSON, J. L. HENRY, H. J. KELLY
J. H. RUSSELL

INT-BM-111411-COMP16
/66- /

INTERIOR-BUREAU OF MINES

••••••••••

ZUG 871 FIELD 7D, 8D, 8G,11B

BIOTITE-MUSCOVITE SEPARATION

F. J. CSERVENYAK, R. B. ADAIR
J. S. BRONNING

INT-BM-111471-1
/66- /

INTERIOR-BUREAU OF MINES

C. Coatings, colorants and finishes

••••••••••

GQF 1344 4 FIELD 11C,11F,11G

MARTIN CO BALTIMORE, MARYLAND

EFFECT OF VACUUM ENVIRONMENT ON MECHANICAL BEHAVIOR OF MATERIALS

I. R. KRAMER

AF-49-638-01455
/65- /

DOD-AIR FORCE

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ZQA 201 FIELD 11C,11F

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

PLATED AND CONVERSION COATINGS

W. CRAWFORD

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

••••••••••

ZQA 204 1 FIELD 9+, 9A,11C,11F

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

EFFECTS OF ORGANIC VAPORS ON ELECTRODEPOSITS

L. GILBERT

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

••••••••••

ZQN 544147 FIELD 11C,11F,13H,11G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

ADSORPTION OF POLYMERS ONTO STEEL SURFACES

J. B. CRILLY, W. S. HAYNES

/65- /

DOD-NAVY

••••••••••

ZQN 544155 6 FIELD 11C,11D,11F,11G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

COOPERATIVE CORROSION STUDIES

C. V. BROUILLETTE

/65- /

DOD-NAVY

••••••••••

ZQN 544164 5 FIELD 11C,11F

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

COATINGS FOR WATER STORAGE TANKS

R. W. DRISKO, W. S. HAYNES

/65- /

DOD-NAVY

••••••••••

ZQN 544166 4 FIELD 7D,11C,13H

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

SPECTROGRAPHIC ANALYSIS OF PAINTS

J. P. CRILLY

/65- /

DOD-NAVY

••••••••••

ZQN 544197 FIELD 11C,11F,11G,20K

LABORATORY INVESTIGATION OF UNDERWATER CURING EPOXIES

R. W. DRISKO

/65- /

DOD-NAVY

••••••••••

ZUG 791 FIELD 11C,11F,13H,11G

USDI, BUR MINES, ROLLA, MISSOURI

ALUMINUM COATING OF STEEL

H. KENWORTHY, F. W. HOERTEL
A. G. STARLIPER

INT-BM-111451-16
/66- /

INTERIOR-BUREAU OF MINES

D. Composite materials

••••••••••

GQN 544109 1 FIELD 9+, 9A,11D,11G

HI-STRENGTH INSULATORS

J. O. SWEENEY

TCG01331A
/65- /

DOD-NAVY

••••••••••

ZQA 192 FIELD 13H,11D,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF COMPOSITE TRANSPARENT PLASTIC FILMS

L. LYNCH

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

••••••••••

ZON 544139 FIELD 5A,11D,11G

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

STRUCTURAL PLASTICS

R. A. BRECKENRIDGE

/65- /

DOD-NAVY

F. Metallurgy and metallography

GH 165 4 FIELD 11F,11G

BATTELLE MEMORIAL IN, OHIO

AN INVESTIGATION OF IMPURITY ELEMENTS, STRUCTURE, AND PRESTRAIN ON THE TENSILE TRANSITION TEMPERATURE OF CHROMIUM

R. I. JAFFEE

NASA-NASW-101-E-4
1/64- 3/65

NASA

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GH 975 4 FIELD 11F

NEW YORK UNIVERSITY, SCHOOL OF ENGINEERING, METAL MECH + MAT SCI, NEW YORK

INVESTIGATION OF THE EFFECT OF PRESSURE ON METALLURGICAL PHENOMENA

H. MARGOLIN

NASA-NSG-90-E-4
1/64-12/64

NASA

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GPF 505 3 FIELD 11F,18A,20L

THE EFFECTS OF NEUTRON IRRADIATION ON THE ELECTRONIC PROPERITES OF BINARY ALLOYS

A. B. LEWIS, L. N. BOLEN, A. B. CULLEN

AT(40-1)2891
9/65-10/66

AEC-DIVISION OF PHYSICAL RES

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GPF 867 1 FIELD 7D, 7A,20M,11F

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, MICHIGAN

TRANSPORT PROPERTIES IN LIQUID METALS

E. E. HUCKE

AT(11-1)1352
12/65-11/66

AEC-DIVISION OF PHYSICAL RES

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GPF 882 1 FIELD 7D,11F,11G,12A

UNIVERSITY OF OKLAHOMA, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, OKLAHOMA

DIFFUSION IN BINARY LIQUID METAL SYSTEMS

F. B. CANFIELD

AT(40-1)-3396
5/66- 4/67

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GPF 952 FIELD 11F,11G, 7B

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

A COMBINED MACROSCOPIC AND MICROSCOPIC APPROACH TO THE MECHANICAL PROPERTIES OF METALS

D. C. DRUCKER, R. M. ARMSTRONG, T. BUTLER E. ERGINER, J. GURLAND, C. T. LIU K. PRINCE

AT(30-1)-2394
5/66- 4/67

AEC-DIVISION OF PHYSICAL RES

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GQA 314 1 FIELD 11F,13H,11G, 7B

BONDING INTERACTIONS OF IMPURITIES IN BODY-CENTERED CUBIC TRANSITION METALS AND THEIR EFFECTS ON THE DUCTILE-TO-BRITTLE TRANSITION

E. SCALA

DA-31-124-ARO-D-228
/65- /

DOD-ARMY

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GQA 345 FIELD 11F,11G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, MIN METAL + PETROL ENG, ILLINOIS

MARTENSITIC TRANSFORMATIONS IN THE BINARY IRON ALLOYS IRON-IR IRON-OSMIUM IRON-PT AND IRON-RU

C. M. WAYMAN

DA-31-124-ARO-D-281
/65- /

DOD-ARMY

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GQA 468 FIELD 11F,11G

MARTIN CO BALTIMORE, MARYLAND

THE MECHANISM OF STRESS-CORROSION CRACKING

E. N. PUGH

DA-31-124-ARO-D-258
/65- /

DOD-ARMY

••••••••••

GQA 471 2 FIELD 7A, 7D,11F,11G

MARTIN CO BALTIMORE, MARYLAND

THE ENVIRONMENT-SENITIVE MECHANICAL BEHAVIOR OF MATERIALS

A. R. WESTWOOD

DA-31-124-ARO-D-63
/65- /

DOD-ARMY

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GQA 472 1 FIELD 7D, 7C,11F,20J

STUDIES ON THE HIGH-TEMPERATURE OXIDATION OF MOLYBDENUM TUNGSTEN NIOBIUM TANTALUM TITANIUM AND ZIRCONIUM

E. A. GULBRANSEN

DA-3U-124-ARO-D-196
/65- /

DOD-ARMY

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GSE 945 FIELD 11F,11G

RESEARCH INITIATION - STRUCTURAL CHARACTER OF SUPERPLASTIC ALUMINUM ALLOYS

R. J. DEANGELIS

GK-963
2/66- 1/67

NSF-ENGINEERING SCIENCES DIVISION

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GSE 948 FIELD 11F,13H,11G

RESEARCH INITIATION - CORRELATION OF FATIGUE AND RESIDUAL STRESS IN METALS

R. S. GOODRICH

GK-955
2/66- 1/67

NSF-ENGINEERING SCIENCES DIVISION

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GSE 951 FIELD 20M,11F,11G,20L

RESEARCH INITIATION - GRAIN BOUNDARY DIFFUSION

J. P. STARK

GK-957
2/66- 1/67

NSF-ENGINEERING SCIENCES DIVISION

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ZQA 205 FIELD 11F,13H,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

FRACTURE TOUGHNESS OF CASE HARDENED STEELS

L. PITTMAN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

••••••••••

ZQA 206 FIELD 11F,13H,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

RELATION OF CAST METAL PROPERTIES TO TEST BAR DESIGN

W. WURTZ

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

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ZQF 284718 FIELD 7D,20M,11F,11G

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

DEFECT STRUCTURES IN PROPERTIES OF FACE-CENTERED CUBIC METALS

H. L. GEGEL

/65- /

DOD-AIR FORCE

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ZQF 284895 FIELD 20M,11F,13H,11G

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

EUTECTOID DECOMPOSITION OF TITANIUM BINARY ALLOYS

H. L. GEGEL

/65- /

DOD-AIR FORCE

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ZQF 284896 FIELD 11F,13H,11G

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

DEFROMATION AND AGING OF BODY-CENTERED CUBIC METALS

C. S. HARTLEY

/65- /

DOD-AIR FORCE

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ZQN 544140 1 FIELD 5A,11F

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

BIOLOGICAL CORROSION OF METALS

H. P. VIND, W. S. HAYNES

/65- /

DOD-NAVY

****

ZUG 788 FIELD 11F,13H

USDI, BUR MINES, MINNEAPOLIS, MINNESOTA

CONCENTRATION OF IRON-BEARING ORES BY MIGRATION AND CONSOLIDATION OF METALLIC IRON

N. B. MELCHER, H. M. FINE

INT-BM-111431-3
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 795 FIELD 11F,13H

USDI, BUR MINES, ALBANY, OREGON

STEEL FROM AUTOMOBILE SCRAP AND DIRECTLY REDUCED ORE

A. H. ROBERSON, L. H. BANNING
G. W. ELGER, A. D. FUGATE

INT-BM-111411-COMP27
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 799 FIELD 5A,11F,13H

RECOVERY OF COPPER AND BYPRODUCTS FROM SOUTHWESTERN ORES

B. H. CLEMMONS, P. A. BLOOM, L. G. EVANS
R. D. GROVES, S. J. HUSSEY
W. A. MCKINNEY, B. K. SHIBLER

INT-BM-111461-3
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 801 FIELD 11F,13H

REMOVAL OF UNDESIRABLE ELEMENTS FROM SCRAP STEEL

F. D. LAMB, H. S. CALDWELL
P. M. SULLIVAN

INT-BM-111421-24
/66- /

INTERIOR-BUREAU OF MINES

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ZUG 810 FIELD 11F,13H

USDI, BUR MINES, S.L.C., UTAH

CHEMICAL PROCESSING OF FERROUS SCRAP

B. H. CLEMMONS, J. P. BAUR, H. DOLEZAL
S. L. MAY, C. H. SCHACK

INT-BM-111461-13
/66- /

INTERIOR-BUREAU OF MINES

G. Miscellaneous materials

****

GH 1729 FIELD 11G

USDC, NATL BUR STAN, DIST OF COLUMBIA

DEVELOP ONE OR MORE METHODS FOR MAKING MECHANICAL COMPLIANCE MEASUREMENTS OF CRACK-TOUGHNESS TEST-SPECIMENS

. NONE

R-09-022-042
6/65- 3/66

NASA

****

GPF 953 FIELD 11G

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

A COMBINED MACROSCOPIC AND MICROSCOPIC APPROACH TO THE MECHANICAL PROPERTIES OF METALS - CONTINUUM THEORY

D. C. DRUCKER, R. W. ARMSTRONG, T. BUTLER
E. ERGINER, J. GURLAND, C. T. LIU
K. PRINCE

AT(30-1)2394
5/66- 4/67

AEC-DIVISION OF PHYSICAL RES

****

GQF 259878 FIELD 11G,10B,20L

NEW YORK UNIVERSITY, GRADUATE SCHOOL, NEW YORK

INVEST INORGANIC ORGANIC + MIXED MATS FOR UTILIZATION AS GASKETING MATERIALS AT ULTRA-HIGH PRESSURES

M. PRINCE

AF-19-628-04996
/65- /

DOD-AIR FORCE

****

GQF 284671 2 FIELD 7C, 7D,20M,11G

MELLON INST OF INDUS, PENNSYLVANIA

MECHANICAL BEHAVIOR AND PHYSICAL CHEMISTRY OF POLYMERS

T. G. FOX

AF-33-657-10661
/65- /

DOD-AIR FORCE

****

GQF 284674 1 FIELD 7C, 7D,20M,11G

RELATIONSHIPS BETWEEN POLYMERS AND THEIR GLASS-TRANSITION TEMPERATURES

O. G. LEWIS

AF-33-657-11224
/65- /

DOD-AIR FORCE

****

GQF 284676 3 FIELD 20M,11G,11H,12A

RENSSELAER POLYTC INST, SCHOOL OF ENGINEERING, MECHANICS, NEW YORK

HEAT AND MASS TRANSFER EFFECTS IN SLIDING METAL SYSTEMS LUBRICATED BY SOLID INTERFACIAL FILMS

F. F. LING

AF-33-657-10058
/65- /

DOD-AIR FORCE

****

GVE 890168 FIELD 7C, 7D,20M,11G

TOTALLY ACETYLATED CASTOR OIL FOR USE AS PLASTICIZERS

R. K. BHATNAGAR

AGF-A07-UR-107
1/66-12/66

AGRICULTURE-DEPT OF AGRICULTURE

****

NG 100 FIELD 11G,12A

THEORETICAL AND EXPERIMENTAL STUDIES OF THERMOMECHANICAL BEHAVIOR OF NON-LINEAR VISCOELASTIC MATERIALS

B. BERNSTEIN, L. A. BERTRAM

9/64- 9/65

PURDUE UNIVERSITY

****

ZQA 11 FIELD 7C, 7D,11B,11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

IDENTIFICATION OF GREASE OXIDATION PRODUCTS

G. MURPHY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 13 FIELD 11G,11H,20D,15B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF FLUIDS WITH IMPROVED CORROSION RESISTANCE WATER STABILITY AND LUBRICITY

R. JOHNSON

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 14 FIELD 20H,11G,11H,10B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

THERMAL STABILITY OF CHEM COMPOSITIONS FOR MULTI-PURPOSE POWER TRANSMISSION FLUID

R. LEMAR

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 48 FIELD 20H,11G,11D,12A

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

FIBERGLASS TUBE MORTAR STUDY

D. L. SPRING, C. I. GUTIERREZ

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 171 FIELD 11G,11D,11F

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

PHOTOELASTIC STUDY-STRESS DISTRIBUTIONS IN FIBER-REINFORCED COMPOSITES

T. MACLAUGHLIN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 172 FIELD 11G,11D,12A

USA, ORD CORPS, WATERVLIET ARSNL, NEW YORK

THREE DIMENSIONAL FORCE TRANSFER BETWEEN MICROFIBERS

M. SADOWSKY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 181 FIELD 7D,11G,11C, 7B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

INNOVATIONS IN PHOSPHATIZING TECHNIQUES

J. DOSS

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 188 FIELD 20H,11G,11D

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF RUBBER COMPOSITIONS FOR HIGH TEMPERATURE USE

W. VERDEVEN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 191 FIELD 11G,11C

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

COATED FABRICS HEAT SEALABLE AND WIDE RANGE TEMPERATURE FLEXIBILITY

A. C. SAUNDERS

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 198 FIELD 7C,11G, 7B

INJECTION MOLDING OF ELASTOMERS

J. RUBY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 199 FIELD 7C,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

IMPROVEMENTS IN ELASTOMER PERFORMANCE UNDER ARTIC ENVIRONMENTS

R. FADRO

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 203 FIELD 11G,11H.11F

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

STUDY OIL SOLUBLE VOLATILE CORROSION INHIBITOR COMPOUNDS

R. JOHNSON

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 208 FIELD 7C, 7D,11G, 7B

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

SYNTHESIS OF POLYOXYPROPYLENE TERPOLYMERS

E. SPEARMAN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 209 FIELD 7C, 7D,20H,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

SEMI INORGANIC HEAT RESISTANT ELASTOMERS BASED ONBORON

L. WIEDENMANN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 218 FIELD 11G,11D,11H,11F

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

SELF LUBRICATING MATERIALS

G. MURPHY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 220 FIELD 7C, 7D,11G,11H

EVALUATION OF NEW DEVELOPMENTS IN LUBRICATION FOR ARMY USE

M. FISHER

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 224 FIELD 7C, 7D,11G,11C

DEVELOP MORE RELIABLE ACCELERATED LAB TESTS FOR CORROSION PREVENTIVES

R. JOHNSON

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQF 284684 2 FIELD 20H,11G

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

INVESTIGATIONS OF STRUCTURE-PROPERTY RELATIONSHIPS OF POLYMERIC MATERIALS

P. M. WILLIAMSON

/65- /

DOD-AIR FORCE

****

ZQF 284894 FIELD 11G,11D,11F,13H

USAF, AFSC, RTD, WRIGHT-PATT-AF MAT LAB, OHIO

COMPOSITE FUNDAMENTALS

J. A. HERZOG

/65- /

DOD-AIR FORCE

****

ZQN 544156 5 FIELD 11G, 5A

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

CORROSION RESISTANCE PIPE AND TUBING

T. ROE

/65- /

DOD-NAVY

H. Oils, lubricants, and hydraulic fluids

•••••••••

ZQA 16 FIELD 7C, 7D,20M,11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DIFFUSION OF GASES THROUGH OIL FILMS

H. HUFFLEY

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

•••••••••

ZQA 193 FIELD 11H,11F,11G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

INVESTIGATE MVTR-CORROSION RELATIONSHIP OF TRANSPARENT PLASTIC FILMS

L. LYNCH

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

•••••••••

ZQA 210 FIELD 11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

PERMEABILITY OF GREASES AS A BASIS FOR DETERMINING THICKENER STRUCTURE

S. F. CALHOUN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

•••••••••

ZQA 221 FIELD 11H,11G,20D,15G

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

EFFECT OF CONTAMINANTS ON SHEAR STABILITY OF HYDRAULIC FLUIDS

R. LEMAR

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

•••••••••

ZQA 222 FIELD 11H

USA, ORD CORPS, ROCK ISL ARSNL, ILLINOIS

DEVELOPMENT OF HIGH TEMPERATURE HYDRAULIC FIELD

R. LEMAR

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

12 MATHEMATICAL SCIENCES

A. Mathematics and statistics

•••••••••

NCA 38 FIELD 13F,12A, 9D

MASS DATA ANALYSIS

H. W. CASE, R. BRENNER, W. W. MOSHER

2/65- 2/66

CALIFORNIA, UNIVERSITY OF-ALL BRANCHES

•••••••••

NCA 45 FIELD 13F,12A, 5C

ROUTINES FOR CURVE FITTING AND STATISTICAL ANALYSIS

H. W. CASE, H. G. REICHENBACH

10/64-10/65

CALIFORNIA, UNIVERSITY OF-ALL BRANCHES

•••••••••

NGI 34 FIELD 13F,12A,22C

NONSTATIONARY RANDOM INPUTS AND RESPONSES

M. C. BENARD, R. P. CHEN

/66- /

GEORGIA INSTITUTE OF TECHNOLOGY

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GSS 1172 FIELD 12A

BASIC INVESTIGATIONS ON LOGIC OF SUBJUNCTIVE CONDITIONALS - QUANTIFICATION THEORY AND SET THEORY

R. B. ANGELL, R. L. WILSON

NSF-GS-630
1/65- 1/66

NSF-SOCIAL SCIENCES DIVISION

•••••••••

GSS 1220 FIELD 12A

MATHEMATICAL LOGIC

N. D. BELNAP, A. R. ANDERSON

NSF-GS-689
5/65- 5/66

NSF-SOCIAL SCIENCES DIVISION

•••••••••

GSS 1249 FIELD 12A

THE LOGICAL FOUNDATIONS OFSTATISTICAL INFERENCE

H. E. KYBURG

NSF-GS-708
7/65- 7/66

NSF-SOCIAL SCIENCES DIVISION

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

•••••••••

GSE 939 FIELD 10B

CRYOGENIC THERMAL REGENERATOR INVESTIGATION

W. E. GIFFORD, R. W. HEIMBURG

GK-798
2/66- 1/67

NSF-ENGINEERING SCIENCES DIVISION

•••••••••

GSE 982 FIELD 20D,20K

HEAT TRANSFER SYSTEMS CONSISTING OF WATER-AIR SPRAY COMPOSITIONS

J. E. SUNDERLAND

GK-766
1/66-12/66

NSF-ENGINEERING SCIENCES DIVISION

•••••••••

NGI 36 FIELD 21D, 7D

INDUSTRIAL PRODUCTS DEVELOPMENT

W. H. BURROWS, W. R. TOOKE

1/66- 1/67

GEORGIA INSTITUTE OF TECHNOLOGY

•••••••••

PAN 2 FIELD 20K

STATIC TESTS OF COMPOSITE STEEL-CONCRETE BEAMS

A. A. TOPRAC, J. W. HALL

/66- /

AMERICAN IRON + STEEL INSTITUTE

•••••••••

PAR 1 FIELD 10B

DEVELOPMENT OF NATURAL GAS PRESSURE BOOSTER PUMP

C. MARTIN, R. LYNN, R. TUPA

1/66-12/66

ASSOCIATION OF AMERICAN RAILROADS

•••••••••

PAR 12 FIELD 10B

GAS APPLIANCE DESIGN FOR USE OF ELEVATED GAS PRESSURES

E. J. WEBER

1/66-12/66

ASSOCIATION OF AMERICAN RAILROADS

•••••••••

PAR 13 FIELD 20D,10B

DESIGN OF GAS APPLIANCES FOR OUTDOOR INSTALLATION

D. W. DEWERTH

1/66-12/66

ASSOCIATION OF AMERICAN RAILROADS

•••••••••

PAR 14 FIELD 10B

GAS RANGE IMPROVEMENT PROGRAM

E. H. PERRY, R. C. GEHRKE

1/66-12/66

ASSOCIATION OF AMERICAN RAILROADS

****

ZUA 189 FIELD 11G

USA, OAD CORPS, ROCK ISL ARSNL, ILLINOIS

EVAL MECH CLOSURES IN COMPARISON WITH FUSIN CLOSURES IN TRANSPARENT PACKAGES

G. F. MARTIN

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZUA 190 FIELD 11G,11H

USA, OAD CORPS, ROCK ISL ARSNL, ILLINOIS

INVESTIGATE ADAPTABILITY OF HEAT SHRINKABLE FILMSFOR TRANSPARENT PACKAGES

R. MURRENS

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQN 544076

IMPROVEMENTS FOR POLAR CAMPS

E. H. MOSER

/65- /

DOD-NAVY

****

ZQN 544123 2 FIELD 11F,10B

MULTI-PURPOSE MOBILE UTILITY PLANT

E. J. BECK, E. H. WOLFF

/65- /

DOD-NAVY

****

ZQN 544127 5 FIELD 7D,20M

USN, BUR YDS + DOCKS, PORT HUENEME, CALIFORNIA

INVESTIGATION OF BOILING HEAT TRANSFER IN VAPOR COMPRESSION STILLS

E. J. BECK

/65- /

DOD-NAVY

****

ZQN 544225 FIELD 12A

SAMPLING PROCEDURE FOR SURVEY OF MAINTENANCE CONDITIONS

G. W. MORRIS

/65- /

DOD-NAVY

****

ZT 87 2 FIELD 11F,11G,20K,10B

TENN VALLEY AUTHORITY, TENNESSEE

STUDY OF CREEP CHARACTERISTICS OF T-11 AND T-22 BOILER TUBING AND P-11 AND P-22 MAIN AND REHEAT STEAM PIPING

- NONE

/66- /

TENNESSEE VALLEY AUTHORITY

****

ZT 108 2 FIELD 20D,10B

TENN VALLEY AUTHORITY, TENNESSEE

STUDIES OF BEND LOSSES AND VANING IN LARGE CONDUITS

- NONE

/66- /

TENNESSEE VALLEY AUTHORITY

****

ZT 153 FIELD 11B

MINIMUM REINFORCEMENT FOR CONTROL OF CRACKING IN CONCRETE

W. C. BOOP, R. W. CANNON

/66- /

TENNESSEE VALLEY AUTHORITY

****

ZT 154 FIELD 20K

EFFECT OF BAR SPACING AND COVER THICKNESS ON SPLICE REQUIREMENT FOR REINFORCING BARS

W. C. BOOP, R. W. CANNON

/66- /

TENNESSEE VALLEY AUTHORITY

****

ZUA 846 FIELD 8H, 7B

APPLICATION OF INSTRUMENTS TO WATER QUALITY MONITORING

D. MCCARTNEY

INT-GS-PA-23-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

****

ZUF 272 FIELD 8G, 8D

USDI, BUR RECLAM, DENVER, COLORADO

INSTALLATION OF TUNNEL SET LOAD CELLS IN DIVIDE TUNNEL, COLORADO

E. J. SLEBIR, L. A. BROWN, J. REED

DR-232
/66- /

INTERIOR-BUREAU OF RECLAMATION

****

ZUG 873 FIELD 7C, 7D

USDI, BUR MINES, TUSCALOOSA, ALABAMA

APPLICATION OF DYES AND SURFACE ACTIVE ORGANIC COMPOUNDS TO THE FLOTATION OF INDUSTRIAL MINERALS

F. J. OSERVENYAK, J. S. BROWNING
A. G. SMELLEY

INT-BM-111471-7
/66- /

INTERIOR-BUREAU OF MINES

****

ZUG 874 FIELD 7C, 7D, 7B

USDI, BUR MINES, BARTLESVILLE, OKLAHOMA

PROCEDURES AND METHODOLOGY APPROPRIATE FOR INSTRUMENTAL DETERMINATION OF HYDROCARBONS AND NITROGEN OXIDES IN AUTOMOTIVE EXHAUST

A. DIMITRIADES, J. W. VOGH

INT-BM-13-BPR-65-16
/66- /

INTERIOR-BUREAU OF MINES

A. Air conditioning, heating, lighting and ventilating

****

7GX 138 3 1 FIELD 13A, 7D, 7B

FUNDAMENTALS OF AIR CLEANING BY ADSORPTION PROCESSES

M. J. LOW, M. SHIMIZU

7-AP-00211-03
7/65- 5/66

PHS-BSS

****

7GX 765 3 FIELD 13A, 7D,20N,20L

BASIC STUDY OF AIR POLLUTION CONTROL WET-SCRUBBERS

S. CALVERT

7-AP-00320-03
7/65- 8/66

PHS-BSS

****

7GX 867 1 FIELD 13A,20L

BEHAVIOR OF AEROSOL PARTICLES

R. S. SHOLTES

7-AP-00493-01
2/66- 1/67

PHS-BSS

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7GX 1209 1 FIELD 13A,13B

PARTICULATE EMISSIONS FROM WOOD WASTE COMBUSTION

R. W. BOUBEL

7-AP-348-01A2
12/65-11/66

PHS-BSS

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7GX 1563 1 FIELD 13A, 7D, 8G, 5A

ANALYSIS OF ATMOSPHERIC DUST BY ELECTRON OPTICS

H. U. RHOADS

(7AP-00372-01)
2/66- 1/67

PHS-BSS

••••••••••

7GX 1659 2 FIELD 13A,11A,11C

PARTICULATE SAMPLING BY ADHESIVE COATED MATERIALS

C. W. GRUBER, C. E. SCHUMANN

7-AP-00370-02
10/65- 9/66

PHS-BSS

••••••••••

7GX 3211 1 FIELD 13A,13B, 7D, 7B

STUDY OF AIR POLLUTANTS BY ABSORPTION SPECTROSCOPY

C. E. MOORE

7-AP-00444-01
12/65-11/66

PHS-BSS

••••••••••

7ZX 4092 1 FIELD 13A, 7D

COMPARISON OF METHODS OF MEASURING PARTICULATE EMISSIONS IN STACK GAS

S. HOCHHEISER, W. BASNAGILL, M. NOLAN

BSS-D-3
/65- /

PHS-BSS

••••••••••

ZT 151 FIELD 13A,12A,23K

ULTIMATE STRENGTH DESIGN CHARTS FOR DESIGN OF REINFORCED CONCRETE CHIMNEYS

W. C. BOOP, R. W. CANNON

/66- /

TENNESSEE VALLEY AUTHORITY

••••••••••

ZUG 524 1 FIELD 13A,13B,21D, 7D

COMPOSITION AND CHARACTERISTIC REACTIONS OF AUTOMOTIVE EXHAUST GAS

B. DIMITRIADES, J. D. CLINGENPEEL
B. G. DIMITRIADES, R. D. FLEMING
R. W. HURN

BSS-B-6
/65- /

INTERIOR-BUREAU OF MINES

••••••••••

ZUG 817 FIELD 13A, 7D,10B, 7B

DEVELOPMENT OF CHROMATOGRAPHIC TECHNIQUES FOR DIESEL EXHAUST ANALYSIS

R. W. FREEDMAN, H. W. LANG

INT-BMHS-20-12
/66- /

INTERIOR-BUREAU OF MINES

B. Civil engineering

••••••••••

7GX 600 7 FIELD 13B, 5A, 8H

U. S. S. R. LITERATURE ON WATER SUPPLY AND POLLUTION CONTROL

B. S. LEVINE

7-WP-00305-07
1/66-12/66

PHS-BSS

••••••••••

7GX 1274 2 FIELD 13B,12A, 5C

OXYGEN USE RATES IN ACTIVATED SLUDGE SYSTEMS

H. S. SMITH, D. B. MCDONALD

7-WP-00695-02
9/65- 8/66

PHS-BSS

••••••••••

GR 72

UPDATING + REPUBLISHING PROVIDENCE COLLEGE HILL REPORT-RENEWAL AND PRESERVATION OF HISTORIC AREA

F. H. MALLEY

/66- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 74 FIELD 13B

TO DEMONSTRATE HOW BLIGHTING EFFECT OF CHANGING SUBSOIL CONDITIONS MAY BE CORRECTED

J. G. BONHAM

/66- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 75

REHABILITATION + PRESERVATION OF HISTORIC COMMERCIAL AREAS

H. BAPTISTA

/66- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 81 FIELD 13B

METHODS OF PREVENTING FAILURE OF SEPTIC TANK PERCOLATION FIELDS

• NONE

4-52
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 82 FIELD 13B

CRITERIA NEEDED FOR ESSENTIAL SOIL TESTS

• NONE

5-10
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GR 83 FIELD 13G,13B

SLOPE STABILITY RATIOS AND EROSION CONTROL

• NONE

5-13
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GSE 1046 FIELD 13B

DEWATERING OF SEWAGE SLUDGE ON GRANULAR MATERIALS

J. H. NEBIKER

GK-424
3/66- 2/67

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

PHK 6 FIELD 13B,13F,11B,13H

DEVELOPMENT OF APPROPRIATE METHODS FOR EVALUATING THE EFFECTIVENESS OF STABILIZING AGENTS

E. J. BARENBERG, E. DANNER

7/64- 6/65

HIGHWAY RESEARCH BOARD

••••••••••

ZQA 97 FIELD 22D,13B,21I, 7D

MONITORING OF ENVIRONMENTAL DISPERSION OF BERYLLIUM FROM DISPOSAL OF A SOLID PROPELLANT BY TRENCH BURNING AT DUGWAY PROVING GROUND U

R. G. MCCALL, A. PECZENIK

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

••••••••••

ZUA 828 FIELD 13B, 8D, 8H

EXPERIMENTAL STUDIES OF ARTIFICIAL RECHARGE OF TREATED SEWAGE THROUGH AN INJECTION WELL

P. COHEN, C. N. DURFOR, J. ISBISTER
W. R. MILLER

INT-GS-NY-21-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

••••••••••

ZUG 857 FIELD 13B, 7C,21D, 7D

USE OF COAL IN WASTE WATER PURIFICATION - PRODUCTION OF COAL CHARS AS ADSORBENTS FOR WASTE WATER

J. H. FIELD, A. J. FORNEY, G. E. JOHNSON

INT-BM-11114122-10
/65- /

INTERIOR-BUREAU OF MINES

F. Ground transportation equipment

••••••••••

NCA 39 FIELD 13F,12A, 5C

MATHEMATICAL ANALYSIS OF ACCIDENTS

H. W. CASE, F. A. HAIGHT

11/64-11/65

CALIFORNIA, UNIVERSITY OF-ALL BRANCHES

••••••••••

NCA 41 FIELD 13F,13B

MACROSCOPIC TRAFFIC FLOW THEORY

H. W. CASE, R. BRENNER, W. W. MOSHER

11/64-11/65

CALIFORNIA, UNIVERSITY OF-ALL BRANCHES

••••••••••

NCA 44 FIELD 13F,13B

THE INTERFACE BETWEEN TRANSPORTATION AND LAND USE PLANNING IN URBAN REGIONS

H. W. CASE, R. BRENNER, W. W. MOSHER

10/64-10/65

CALIFORNIA, UNIVERSITY OF-ALL BRANCHES

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YTX 292 FIELD 13F,10B

DEVELOPMENT LENGTH FOR ANCHOR BOLTS

J. E. BREEN, R. TATIKONDA

/66- /

STATE-TEXAS

••••••••••

YTX 293 FIELD 13F,20K

STRENGTH EFFECT OF CUTTING OFF TENSION BARS IN CONCRETE BEAMS

P. W. FERGUSON, S. I. HUSAIN, D. W. LEE R. TATIKONDA

/66- /

STATE-TEXAS

••••••••••

YTX 294 FIELD 13F,20K,10J

DESIGN CRITERIA FOR OVERHANGING ENDS OF BENT CAPS - BOND AND SHEAR

P. W. FERGUSON, J. E. BREEN, R. TATIKONDA D. VICTOR

/66- /

STATE-TEXAS

••••••••••

YTX 295 FIELD 13F,20K

FATIGUE STRENGTH OF 3/4 STUDS IN LIGHTWEIGHT CONCRETE

A. A. TOPRAC, H. G. LEHMAN, H. S. LEW

/66- /

STATE-TEXAS

••••••••••

ZQN 544102 FIELD 13F

TEST AND EVALUATION OF SUPPORT EQUIPMENT

W. H. BEARD, E. H. MOSER

/65- /

DOD-NAVY

••••••••••

ZQN 544121 3 FIELD 13F,13B,15+, 9+

STUDIES MCB CONSTRUCTION OPERATIONS

D. TAYLOR, R. E. JOCHUMS

/65- /

DOD-NAVY

••••••••••

ZQN 544128 FIELD 13F,20K

WATERFRONT STRUCTURES - FLOATS

T. T. LEE, J. T. OBRIEN

/65- /

DOD-NAVY

••••••••••

ZQN 544206 FIELD 13F

TRANSPORTATION EQUIPMENT ALLOWANCE STUDY

W. L. RICHARDSON, C. E. PARKER

/65- /

DOD-NAVY

••••••••••

ZQN 544223 FIELD 13F,12A, 5C,15C

TEMPO PLANNING FACTORS FOR MAINTENANCE UTILITIES AND TRANSPORTATION

W. L. RICHARDSON, C. E. PARKER

/65- /

DOD-NAVY

G. Hydraulic and pneumatic equipment

••••••••••

GSE 1018 FIELD 13G,20L,20D,10B

MATERIAL REMOVAL BY ABRASIVE PARTICLES IN AN AIR STREAM

J. WOLAK

GK-948
3/66- 2/67

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

GUW 341 FIELD 13G,13B, 8H,12A

QUEUEING MODEL FOR POLLUTION TRANSPORT IN STREAMS

F. E. MCJUNKIN

INT-WR-A-007-VA
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

••••••••••

JSS 1 FIELD 13G,11B,11C,11F

UTAH ST UNIV OF AGRIC, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, UTAH

DEFLECTION OF CEMENT MORTAR-LINED AND CEMENT MORTAR-COATED STEEL PIPE WITH NO INTERNAL PRESSURE BURIED IN SOIL

R. K. WATKINS, D. LOOSLE, A. B. SMITH

6/65- 9/65

SMITH SCOTT COMPANY

••••••••••

NIL 178 FIELD 13G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

SCOUR PROTECTION FOR CULVERT OUTLETS

M. B. MCPHERSON, D. D. MEREDITH

/65- /

ILLINOIS, UNIVERSITY OF

••••••••••

NUS 63 FIELD 13G, 8H

SUBMERGED PARSHALL FLUMES

G. V. SKOGERBOE, M. L. HYATT

/66- /

UTAH STATE UNIVERSITY

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YCO 122 FIELD 13G

ROBERT LEE DAM SPILLWAY

J. RUFF

9/65-12/65

STATE-COLORADO

••••••••••

ZT 121 1 FIELD 13G,13B

TENN VALLEY AUTHORITY, TENNESSEE

EFFECTS OF POLLUTION ON WATER USES

M. A. CHURCHILL

/66- /

TENNESSEE VALLEY AUTHORITY

••••••••••

ZUA 862 FIELD 13G,13F, 8F, 8K

SCOUR AT BRIDGE CROSSINGS IN ALASKA

L. S. LEVEEN

INT-GS-ALSK-36-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

••••••••••

ZUA 864 FIELD 13G,13B, 8H, 5A

PEAK DISCHARGES OF WATER FROM EXTREMELY SMALL URBAN WATERSHEDS

L. A. MARTENS, R. M. BURTON, A. L. PUTNAM

INT-GS-NC-30-C
/66- /

INTERIOR-GEOLOGICAL SURVEY

H. Industrial processes

••••••••••

GSE 928 FIELD 11F,13H,13I,11G

CHIP FORMATION AND THE MECHANICS OF METAL CUTTING

J. A. BAILEY

NSF-GK-741
12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

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GSS 777 FIELD 5A,13H

THE TECHNOLOGY OF GOLDWORKING IN THE ANCIENT WORLD

S. Z. LEWIN, P. F. DAVIDSON

NSF-GS-887
5/65- 4/66

NSF-SOCIAL SCIENCES DIVISION

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PAT 2 FIELD 11F,13H,13I

TEMPERATURE DISTRIBUTION IN THE CHIP AND TOOL DURING MACHINING

J. A. BAILEY, C. R. ATTAWAY

1/66-12/66

AMERICAN SOC OF TOOL + MFG ENGR RES FDN

••••••••••

ZUG 793 FIELD 11F,13H

SLAB-SHAPED TITANIUM INGOTS BY COLD-MOLD ARC MELTING

A. H. ROBERSON, S. L. AUSMUS, R. A. BEALL

INT-BM-6-41H1-1100
/66- /

INTERIOR-BUREAU OF MINES

M. Structural engineering

••••••••••

GQA 13 FIELD 12A,13M,10B

IIT RESEARCH INSTITUTE, AT ILL INST OF TECHNOL, ILLINOIS

LABORATORY STUDIES OF SHELTER ENVIRONMENT-SCALED MODELS

W. J. CHRISTIAN, A. GOLDSMITH

8-64210-4949A-18-US
/65- /

DOD-ARMY

••••••••••

GR 86 FIELD 13F,11G

STUDY OF EXTERIOR WALL SYSTEMS AND CONSTITUENT MATERIALS AND COMPONENTS

• NONE

6-29
/65- /

HOUSING AND HOME FINANCE AGENCY

••••••••••

GSE 909 FIELD 12A,13M,20K

STRUCTURAL RELIABILITY USING LIMITED PROBABILITY DISTRIBUTIONS

J. R. BENJAMIN

NSF-GK-745
12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

GSE 942 FIELD 12A,13M,20D

STABILITY OF A LIQUID HEATED FROM BELOW

T. V. DAVIES

GK-946
2/66- 1/67

NSF-ENGINEERING SCIENCES DIVISION

••••••••••

PAR 2 FIELD 7D,12A, 5C,13M

NATURAL GAS FUELED COOLING METHODS AND SYSTEMS

W. F. RUSH, R. ROSENBERG, S. WEIL

1/66-12/66

ASSOCIATION OF AMERICAN RAILROADS

14 METHODS AND EQUIPMENT

B. Laboratories, test facilities, and test equipment

••••••••••

GH 529 2 FIELD 14B

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, ASTRONOMY, ARIZONA

CONDUCT A RESEARCH TO DEVELOP AND TEST A PROTOTYPE PHOTO-POLARIMETER SUITABLE FOR USE WITH BALLOONS AND SPACE VEHICLES

A. H. GEHRELS

NASR-138
11/64-10/65

NASA

16 MISSILE TECHNOLOGY

••••••••••

ZOF 260551 FIELD 9C, 9+, 9A,20D

INTERACTION OF MISSILE ANTENNA SYSTEMS WITH IONIZED FLOW FIELDS

R. J. PAPA

/65- /

DOD-AIR FORCE

17 NAVIGATION, COMMUNICATIONS DETECTION AND COUNTERMEASURES

••••••••••

ZKD 436 FIELD 1E

DEVELOPMENT OF ATC SEPARATION CRITERIA

D. SHAPIRO

FAA-157-003
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

••••••••••

ZKD 440 FIELD 1E,12A

ATC PROCEDURES - NAS METROPLEX STAGE B

J. P. OBRIEN

FAA-134-511
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

••••••••••

ZKD 485 FIELD 1B

CATEGORY II AND III ILS PERFORMANCE ASSURANCE

• NONE

FAA-320-109-000
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

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ZKD 503 FIELD 1E, 1C

CRITERIA FOR THE ESTABLISHMENT OF FACILITY SYSTEMS

J. E. CLARK

FAA-440-606
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

••••••••••

ZKD 553 FIELD 1E,12A,22C

DATA PROCESSING - NAS METROPLEX STAGE A

A. K. KINGSLEY

FAA-133-221
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

••••••••••

ZKD 555 FIELD 1E,12A,22C, 5C

ATC PROCEDURES - NAS METROPLEX STAGE A

J. P. OBRIEN

FAA-133-511
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FAA-SYSTEMS RES + DEVEL SERVICE

••••••••••

ZKD 556 FIELD 1E,12A,22C

DATA PROCESSING - NAS METROPLEX STAGE B

A. K. KINGSLEY

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/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

••••••••••

ZKD 563 FIELD 1E, 1C,22C, 5C

IN-SERVICE ATC SIMULATIONS

L. A. ANDERSON

FAA-154-XXX
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

••••••••••

ZKD 585 FIELD 1C, 1B

DEVELOPMENT OF ENVIRONMENT

G. J. MARKS

FAA-420-203
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FAA-SYSTEMS RES + DEVEL SERVICE

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ZKD 597 FIELD 1E, 1C

DEVELOPMENT OF DESIGNS FOR ATC FACILITY SYSTEMS

J. E. CLARK

FAA-440-601
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FAA-SYSTEMS RES + DEVEL SERVICE

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ZKD 599 FIELD 1C, 1E

DEVELOPMENT OF DESIGNS FOR ENVIRONMENTAL DESIGNS FOR FACILITY SYSTEMS

J. E. CLARK

FAA-440-604
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

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ZPE 1195 FIELD 4A, 6B, 9+,11G

INSTRUMENTATION FOR ENVIRONMENTAL SURVEYS

R. T. GRAVESON, M. E. CASSIDY, N. LATNER J. H. LEVERETT, V. NEGRO

/66- /

AEC-BIOLOGY + MEDICINE

G. Navigation and guidance

****

ZKD 443 FIELD 1C, 1F,17G

ATC CONCEPTS FOR SUPERSONIC VEHICLES

J. P. OBRIEN

FAA-153-512
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

****

ZKD 475 FIELD 1C,17G,13B

V/STOL GUIDANCE EQUIPMENT SYSTEMS

• NONE

FAA-320-103-000
/66- /

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ZKD 478 FIELD 1E,17G

SHORT DISTANCE NAVAID REQUIREMENTS

• NONE

FAA-330-009
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

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ZKD 492 FIELD 1E,17B,17G

LONG TERM PLANNING FOR OCEANIC SYSTEM - L OTOS

S. HIRSHON

FAA-350-104
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ZKD 498 FIELD 17G, 1E

AIRPORT GUIDANCE SIGNS

L. C. VIPOND

FAA-430-007
/66- /

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ZKD 502 FIELD 1E,17B,17G

DRAWINGS AND SPECIFICATIONS FOR NAS

J. E. CLARK

FAA-440-605
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ZKD 512 FIELD 17G, 1C

DEVELOPMENT OF DESIGNS FOR NAVIGATION FACILITY SYSTEMS

J. E. CLARK

FAA-440-603
/66- /

FAA-SYSTEMS RES + DEVEL SERVICE

18 NUCLEAR SCIENCE AND TECHNOLOGY

A. Fusion devices (Thermonuclear)

****

NGI 25 FIELD 18A

CORRUGATED-PLATE SPARK COUNTERS

G. G. EICHHOLZ

/66- /

GEORGIA INSTITUTE OF TECHNOLOGY

****

ZPE 1730 FIELD 20M,11B,11G,18A

ENVIRONMENTAL FACTORS AFFECTING GLASS ROD DOSIMETRY

B. G. BLAYLOCK, J. P. WITHERSPOON

W-7405-ENG-26
/66- /

AEC-BIOLOGY + MEDICINE

G. Radioactive wastes and fission products

****

ZUA 810 FIELD 18G,13B, 8D, 8H

HYDROLOGY OF SUBSURFACE WASTE DISPOSAL - NATIONAL REACTOR TESTING STATION, IDAHO

J. T. BARRACLOUGH

PCA-9-FO
/66- /

INTERIOR-GEOLOGICAL SURVEY

19 ORDNANCE

****

GQA 176 FIELD 11F,13H,11G,15C

GENERAL MOTORS CORP, SANTA BARBARA, CALIFORNIA

PENETRATION MECHANISMS OF HIGH VELOCITY PROJECTILES

J. W. GEHRING

DA-04-495-AMC-534-X
/65- /

DOD-ARMY

****

ZQA 207 FIELD 20D,15G

INVESTIGATE OBSCURATION PROBLEM

P. E. TOWNSEND, H. COMMINGE

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

****

ZQA 227 FIELD 13F,21D,21I,15+

MOBILITY STUDIES FOR ARTILLERY WEAPONS

W. E. HEIDEL

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

D. Explosions, ballistics, and armor

****

ZQA 235 FIELD 7C,19D,21B,21I

RESEARCH AND APPLICATION IN EXPLOSIVES

F. E. ALLISON

/65- /

ARMY-ORDNANCE ARSENAL-FRANKFORD, PHILADE

20 PHYSICS

****

GQA 344 1 FIELD 5A,11G

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, CALIFORNIA

DYNAMIC PHOTOPLASTICITY

W. GOLDSMITH

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DOD-ARMY

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GQA 339 FIELD 9+, 9A,11F,11G

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, PENNSYLVANIA

INVESTIGATION OF THE RELATIONSHIP BETWEEN SEMICONDUCTOR NOISE AND DISLOCATIONS

R. L. LONGINI

DA-31-124-ARO-D-264
/65- /

DOD-ARMY

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GQF 955 6 FIELD 5A, 7D

STANFORD UNIVERSITY, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

EVALUATION OF GENERAL PHYSICS AND NUCLEAR PHYSICS RESEARCH

L. I. SCHIFF

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DOD-AIR FORCE

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GQF 1249 4 FIELD 7D,11B,11F,11G

UNIVERSITY OF DELAWARE, SCHOOL OF ENGINEERING, METALLURGY, DELAWARE

DIFFUSION IN CRYSTALS

C. E. BIRCHENALL

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GQF 3261 3 FIELD 7C,21I, 7A, 7D

GIANNINI RESEARCH LAB, SANTA ANA, CALIFORNIA

ELECTROTHERMALLY ACCELERATED PLASMA JETS

A. C. DUCATI

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GQF 3448 2 FIELD 11G

GEORGE WASHINGTON UNIV, SCHOOL OF ENGINEERING, MECHANICS, DIST OF COLUMBIA

CONTINUOUS DISTRIBUTIONS OF DISLOCATION

G. M. ARKILIC

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GQF 207552 FIELD 20+, 9+, 9A,12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

PARTICLE INTERACTIONS

W. FRIZ

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GQF 258016 1 FIELD 4A, 7B

RESEARCH + EXPERIMENTAL STUDY OF RADIO WAVE PROPAGATION ON N-S LINE FROM SWEDEN-PUERTO RICO-PERU-URUGUAY

B. DUENO

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GQF 258375 2 FIELD 7C, 7D,11C,11F

PARKE MATH. LAB., CA, MASSACHUSETTS

THEORET + MATH EVALUATIONS OF RADIATION DAMAGE + ITS EFFECTS AS WELL AS ON OTHER SPECIFIC PROBLEMS

N. G. PARKE

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GQF 258453 FIELD 4A, 8+, 9+,12A

THEORETICAL + EXPERIMENTAL STUDIES OF ARCTIC PROPAGATION WITH EMPHASI ON COMPLEX MODES

. NONE

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GQF 258963 FIELD 4A, 9+, 9A

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

THEORETICAL AND EXPERIMENTAL STUDIES OF ATMOSPHERE AFFECTS ON PHASE FRONT OF 35GC WAVES

A. T. WATERMAN

AF-19-628-05054
/65- /

DOD-AIR FORCE

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GQF 259097 FIELD 9+, 9A

THEORETICAL + EXPERIMENTAL STUDIES OF RADIATION AND BEAM SCANNING CHARACTERISTICS OF PLASMA COLUMNS

I. KAUFMAN

AF-19-628-05041
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GQF 259388 FIELD 9+, 9C,11G,11F

HUGHES RESEARCH LABS, MALIBU, CALIFORNIA

RESEARCH ON IONIC AND NEUTRAL SPECIES AND THERMO-PLASMAS

. HEIL

AF-19-628-04297
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GQF 259592 FIELD 22A, 4A, 6B, 9C

WENTWORTH INST., BOS, MASSACHUSETTS

R + D OF INSTRUCTION + METHODS OF DETECTING POSITIVE PARTICLES + IONS AND NEGATIVE IONS

. NONE

AF-19-628-04983
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DOD-AIR FORCE

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GQF 259682 FIELD 5A

UNIVERSITY OF HAWAII, GRADUATE SCHOOL, PHYSICS, HAWAII

RESEARCH STUDY OF MOLECULAR SCATTE RING AND FLOURESCENCE OF GASES IN THE VACUM UV

K. WATANABE

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GQF 284679 1 FIELD 7C,11B,11G,11H

SOUTHWEST RES INST, TEXAS

MECHANISMS OF FRICTION AND WEAR IN HIGH VACUUM

R. A. BURTON

AF-33-615-01310
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DOD-AIR FORCE

****

GQF 284692 4 FIELD 11F,11G

MIDWEST RES INST KAN, MISSOURI

MECHANISMS OF FATIGUE

J. C. GROSSKREUTZ

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GQF 284716 4 FIELD 11G,11D,11F,13H

MASS. INDIV. GRANT, MASSACHUSETTS

ELECTRON MICROSCOPE STUDIES OF FILAMENTARY MONOCRYSTALS AND FINE WIRES OF METALLIC SUBSTANCES

A. REVERE

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GQF 284742 4 FIELD 9+, 9A,12A, 9C

MEASUREMENT OF LOCAL SPECTRAL INTENSITIES IN CASE OF A NONUNIFORM LIGHT SOURCE OF RADIAL SYMMETRY

W. L. WOLTGREVEN

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GQF 284828 1 FIELD 11B,11C,11G,11D

GENERAL DYNAMICS CORP, ROCHESTER, NEW YORK

PHOTOEMISSION OF ELECTRONS THROUGH THIN FILM DIELECTRICS

C. DRUMHELLER

AF-33-615-01322
/65- /

DOD-AIR FORCE

D. Fluid mechanics

••••••••••

GQA 449 1 FIELD 20D, 5A,20L, 7B

UNIVERSITY OF VIRGINIA, GRADUATE SCHOOL, PHYSICS, VIRGINIA

SCINTILLATION EFFECTS IN SUPERFLUID HELIUM

F. L. HEREFORD

DA-ARO-D-31-124-G516
/65- /

DOD-ARMY

••••••••••

GQF 305 7 FIELD 20D,10B

UNIV OF TORONTO, SCHOOL OF ENGINEERING, AERONAUTICAL ENGIN, CANADA

TRANSFER OF MASS MOMENTUM AND ENERGY IN FREE MOLECULE SYSTEMS

G. N. PATTERSON

AF-AFOSR-0276-65
/65- /

DOD-AIR FORCE

••••••••••

GQF 320 7 FIELD 12A,13M,20D

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, MATHEMATICS, MARYLAND

MATHEMATICAL RESEARCH IN FLUID DYNAMICS AND APPLIED MATHEMATICS

J. B. DIAZ

AF-AFOSR-0400-64
/65- /

DOD-AIR FORCE

••••••••••

GQF 1143 5 FIELD 12A,20D,10B,20I

CORNELL AERONAUT. LA, NEW YORK

NON-EQUILIBRIUM EFFECTS IN SUPERSONIC FLOWS

J. G. HALL

AF-49-638-01488
/65- /

DOD-AIR FORCE

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GQF 1345 5 FIELD 20D,10B,20I,20L

CORNELL UNIVERSITY, SCHOOL OF ENGINEERING, AEROSPACE ENGINEERING, NEW YORK

THEORY OF CONTINUUM MAGNETOFLUIDYNAMICS

W. R. SEARS, W. R. SEARS

AF-AFOSR-0399-64
/65- /

DOD-AIR FORCE

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GQF 3171 3 FIELD 20D,20I, 7B

UNIV OF ROCHESTER, SCHOOL OF ENGINEERING, AEROSPACE + MECH SCI, NEW YORK

ELECTRON AND ION DENSITY PROFILES AHEAD OF AIR SHOCKWAVES

H. D. WEYMANN

AF-AFOSR-0478-65
/65- /

DOD-AIR FORCE

F. Optics

••••••••••

GQA 328 1 FIELD 5A,20F,20L, 7B

UNIVERSITY OF DELAWARE, GRADUATE SCHOOL, PHYSICS, DELAWARE

CHARACTERISTIC FIELD INHOMOGENEITIES IN HOMOGENEOUS DIELECTRICS IN THE PRE-BREAKDOWN RANGE

K. W. BOER

DA-31-124-ARO-D-173
/65- /

DOD-ARMY

••••••••••

GQF 429 8 FIELD 5A,20F,20I,20J

CATHOLIC UNIV OF AMER, GRADUATE SCHOOL, PHYSICS, DIST OF COLUMBIA

IRREVERSIBLE THERMODYNAMICS

P. H. MEIJER

AF-AFOSR-0445-63
/65- /

DOD-AIR FORCE

••••••••••

GQF 446 11 FIELD 5A,20F,20L, 7B

POMONA COLLEGE, UNDERGRADUATE SCHOOL, PHYSICS, CALIFORNIA

PHYSICS OF LOW ENERGY X-RAYS AND BETA RAYS

B. L. HENKE

AF-AFOSR-0689-64
/65- /

DOD-AIR FORCE

••••••••••

GQF 1212 4 FIELD 20F,20I, 7B

HEBREW UNIVERSITY, ISRAEL

ELECTRON DENSITY IONIZATION RATE AND APPROACH TO THERMAL EQUILIBRIUM BEHIND SHOCK WAVES

W. LOW

AF-61-052-00846
/65- /

DOD-AIR FORCE

••••••••••

GQF 3144 3 FIELD 9+, 9A,20F,20L

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MASSACHUSETTS

RESEARCH IN COHERENT LIGHT AND RADIO OPTICS

P. A. MILES

AF-49-638-01334
/65- /

DOD-AIR FORCE

••••••••••

GQF 3366 2 FIELD 11G,18A,20F,20L

ATOMIC VIBRATIONS IN STRESSED CRYSTAL LATTICES BY INELASTIC SCATTERING OF NEUTRONS

P. WEINZIERL

AF-61-052-00638
/65- /

DOD-AIR FORCE

H. Particle physics

••••••••••

GQF 431 9 FIELD 12A,13M,20H,20L

BOSTON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

STATISTICAL AND QUANTUM MECHANICS

A. SIEGEL

AF-AFOSR-0557-64
/65- /

DOD-AIR FORCE

••••••••••

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